

PORSE
11.3.31.1.1 v40

**WORK PLAN FOR
SUPPLEMENTAL SITE CHARACTERIZATION**

Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon

August 31, 2000

Prepared for:

The Port of Portland
Portland, Oregon

Prepared by:

Hahn and Associates, Inc.
Portland, Oregon

Project No. 5106



POPT1S604952

TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	BACKGROUND	2
2.1	Site Location.....	2
2.2	Current Site Features.....	2
2.3	Site History	2
2.4	Previous Investigations Summary.....	3
2.5	Project Objectives.....	4
3	SITE CHARACTERIZATION PLAN.....	4
3.1.1	Phased Investigation Approach	4
3.1.2	Identified Target Areas and Chemicals of Interest.....	5
3.2	Phase 1 Investigation Approach.....	6
3.3	Soil Characterization Plan.....	6
3.3.1	B-5 Area	6
3.3.2	B-8 Area	7
3.3.3	B-20 Area.....	7
3.3.4	B-29 Area.....	8
3.3.5	B-37 Area.....	8
3.3.6	B-38 Area.....	9
3.3.7	Phase 2 Soil and Groundwater Characterization.....	10
3.4	Groundwater Characterization Plan.....	10
3.4.1	Screening-Level Groundwater Samples (Phase 1).....	10
3.4.2	Groundwater Monitoring Well Installation (Phase 2).....	11
4	BENEFICIAL USE DETERMINATION PLAN	11
4.1	Land Use Determination	11
4.1.1	Current Land Uses.....	11
4.1.2	Reasonably Anticipated Future Land Uses	12
4.2	Beneficial Uses of Water	12
4.2.1	Current Beneficial Uses of Water.....	12
4.2.2	Reasonably Likely Future Beneficial Uses of Water.....	13
5	PROJECT MANAGEMENT PLAN.....	14
5.1	Project Organization.....	14
5.2	Project Schedule.....	16
5.3	Reporting	16
5.4	Work Plan Addendum Procedure.....	16

GLOSSARY OF ABBREVIATIONS

TABLE OF CONTENTS
(continued)

TABLES

- 1 Phase 1 Site Characterization Field Program Summary
- 2 Phase 1 Laboratory Analysis Summary
- 3 Proposed Phase 1 Soil Sampling Program
- 4 Proposed Phase 1 Groundwater Sampling Program: Screening-Level Groundwater Samples

FIGURES

- 1 Location Map
- 2 Site Map
- 3 Petroleum Hydrocarbons in Soil
- 4 Push Probe Soil Sample Locations – B-38 Area
- 5 Push Probe Groundwater Sample Locations – B-38 Area

APPENDICES

- A Sampling and Analysis Plan
- B Site Health and Safety Plan

WORK PLAN FOR SUPPLEMENTAL SITE CHARACTERIZATION

Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon

August 31, 2000

1 INTRODUCTION

The Port of Portland (the Port) has retained Hahn and Associates, Inc. (HAI) to conduct supplemental site characterization activities for upland areas at Marine Terminal 1 South located at 2100 SW Front Avenue, Portland, Oregon (Figure 1). This Work Plan was prepared to further characterize soil and groundwater impacts that were previously detected at the site and to assist the Port in evaluating potential remedial options suitable to foster site redevelopment. This Work Plan was designed to address only upland issues on the Marine Terminal 1 property and incorporates Oregon Department of Environmental Quality (DEQ) comments¹ regarding HAI's August 10, 2000, Draft Work Plan².

This Work Plan consists of five plans which are presented in the following order:

- 1) Site Characterization Plan (SCP)
- 2) Beneficial Use Determination Plan (BUD)
- 3) Project Management Plan
- 4) Sampling and Analysis Plan (SAP) (Appendix A)
- 5) Health and Safety Plan (HASP) (Appendix B)

¹ Oregon Department of Environmental Quality (2000) *Work Plan For Supplemental Site Characterization, Port of Portland, Terminal 1, ECSI #2642*, August 24, 2000

² Hahn and Associates, Inc. (2000a) *Draft Work Plan for Supplemental Site Characterization, Marine Terminal 1 South, 2100 NW Front Avenue, Portland, Oregon*, August 10, 2000

2 BACKGROUND

2.1 Site Location

Marine Terminal 1 South (T1 South or "the Site") is located at 2100 NW Front Avenue, Portland, Oregon (Figure 2). The study area relates only to the portion of Marine Terminal 1 that is located northwest of Interstate 405, northeast of NW Front Avenue, southeast of Slip No. 2, and southwest of the Willamette River (Figure 2).

2.2 Current Site Features

Two primary structures designated as Warehouse No. 2 and House No. 104 are currently located at the Site. Portions of the study area are currently leased by three tenants that include High-Temp Northwest, Inc. (Warehouse No. 2), Thermo Pressed Laminates, Inc. (House No. 104), and Tristar Transload (open storage area southeast of Slip No. 2 and northwest of House No. 104). The remaining portions of the site are currently unoccupied. The topography at the Site is generally level at an elevation of approximately 30 feet above mean sea level (msl). The property is generally asphalt or concrete covered with little or no vegetation.

2.3 Site History

The site history presented here is summarized from information contained in a draft Preliminary Assessment³ (PA) prepared for the Site. In approximately 1884, upland areas of Terminal 1 were located between 100 and 200 feet northeast of NW Front Avenue. Between 1913 and 1936, various parcels of property were purchased by the Commission of Public Docks that now make up the Marine Terminal 1 South complex. The Port assumed ownership of Terminal 1 after its merger with the Commission of Public Docks on January 1, 1971. Filling activities at the Site were generally completed in approximately 1972 when Slip No. 1 was filled.

³ Port of Portland, (2000) *Draft Preliminary Assessment, Port of Portland Terminal 1, 2200 NW Front Avenue, Portland, Oregon, August 2, 2000*

The history of property acquisition regarding T1 South is as follows:

<u>Date:</u>	<u>Activity</u>
1913	Phase 1 acquisition: 11.9 acres (approximate area of House No. 104 and Warehouse No. 2)
1923	Phase 2 acquisition: 7.19 acres (approximate area of open storage area and Slip No. 2)
1936	Phase 3 acquisition: 1.94 acres (adjacent to the Fremont Bridge, filled, and built present dock)

Historically, T1 has been used for the staging of lumber, logs, paper products, steel, containers, and bagged grain.

2.4 Previous Investigations Summary

In 1998, Maul Foster and Alongi, Inc. (MFA) conducted a Focused Environmental Site Assessment (ESA)⁴ at the site that included installation of 13 push probe borings. In August 1999, Bridgewater Group, Inc., (Bridgewater) prepared a scope of work⁵ for additional investigation activities at the Site. In February and March 2000, HAI implemented the Bridgewater scope of work, which is documented in HAI's May 15, 2000, Environmental Baseline Investigation report⁶.

The baseline assessment and characterization activities conducted by HAI and MFA identified two general areas of petroleum-impacted soil at the Site exceeding reference levels, including the B-5 and the B-38 areas (Figure 3). In addition, three other areas (B-20, B-29, and B-37) show low level petroleum impacts that do not exceed reference levels. Soil impacts extend to the depth of the water table [approximately 20 feet below ground surface (bgs)] only at the B-38 area.

⁴ Maul Foster and Alongi, Inc., (1998) *Focused Environmental Site Assessment, Terminal 1, Between Slip No. 2 and the Fremont Bridge, Northwest Portland, Oregon, August 25, 1998*

⁵ Bridgewater Group, Inc. (1999) *Draft Scope for Assessing Baseline Conditions at Terminal 1 South, August 5, 1999*

⁶ Hahn and Associates, Inc. (2000b) *Environmental Baseline Investigation For Marine Terminal 1, 2100 NW Front Avenue, Portland, Oregon, May 15, 2000*

Analytical testing of groundwater samples indicates that polynuclear aromatic hydrocarbons (PAHs) are present at concentrations exceeding risk-based levels within the B-38 area. Bis(2-ethylhexyl)phthalate (DEHP) was detected at two up-gradient locations (GW-1 and GW-10) and one down-gradient location (GW-4) at concentrations exceeding reference levels; however, the source of DEHP was determined to be either laboratory/equipment contamination, or from off-site based on concentration distribution.

2.5 Project Objectives

The purpose of the proposed investigation is to supplement information that was gathered during Focused ESA (MFA 1998) and Environmental Baseline and Site Characterization (HAI 2000) activities previously conducted at the Site. The primary objectives of the supplemental site characterization activities are to:

- 1) Determine the full nature and extent of soil impacts identified at the Site
- 2) Gather sufficient constituent data that could be used to conduct risk evaluation of petroleum impacts
- 3) Determine the extent of groundwater impacts identified in the B-38 area and establish a groundwater monitoring network, if necessary
- 4) Determine the beneficial uses of land and water in the locality of the site, if necessary
- 5) Perform site characterization and if necessary remediation to support Site redevelopment

3 SITE CHARACTERIZATION PLAN

3.1.1 Phased Investigation Approach

This Site Characterization Plan (SCP) was designed such that investigative activities can be conducted in one or more phases. The phased approach will allow for a more focused and efficient site characterization process in that subsequent phases will concentrate only on those areas where additional work activities are deemed necessary.

This Work Plan outlines the first phase (Phase 1) of site characterization activities. Phase 1 site characterization activities will include soil sampling and screening-level groundwater sampling in an effort to determine the nature and extent of impacts at targeted areas. Phase 1 will be conducted primarily through the use of push probe methodology. Based on the results of the Phase 1 investigation, Phase 2 activities may be

conducted involving additional soil and/or groundwater characterization if necessary, and/or the installation of a groundwater monitoring well network if necessary.

The SCP described herein relates only to Phase 1 site characterization activities since the necessity and extent of Phase 2 is not known. The site characterization activities described herein will be conducted in accordance with the Project Management Plan, Sampling and Analysis Plan (SAP), and Health and Safety Plan. The SAP and HASP are included in Appendices A and B, respectively.

3.1.2 Identified Target Areas and Chemicals of Interest

The areas targeted for investigation at T1 South are limited to those areas identified in previous investigations (MFA 1998; HAI 2000) where soil and/or groundwater impacts were identified at the site and as requested by DEQ (specifically the Slip No. 1 sediments). The six areas that are to be investigated are shown on Figure 3 and include:

<u>Area</u>	<u>Target Area Description</u>
B-5	Between House No. 104 and Warehouse No. 2
B-8	Southeast bottom of former Slip No. 1
B-20	Northwest end of site near former gear locker and Slip No. 2
B-29	Inside Warehouse No. 102 near railroad pit
B-37	Dry well located between House No. 104 and Warehouse No. 2
B-38	West end open storage area

Based on the Focused ESA (MFA 1998) and Environmental Baseline and Site Characterization (HAI 2000), the currently identified contaminants of potential concern (COPCs) in soil at the Site include total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), and lead. COPCs in groundwater at the Site include BTEX, PAHs, and bis(2-ethylhexyl)phthalate (DEHP), although the latter appears to be either from laboratory/equipment contamination, or from off-site based on concentration distribution. For characterization purposes, the investigation activities proposed herein will also evaluate if additional COPCs may be present in the areas of concern, particularly volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), metals, and tributyl tin (TBT).

3.2 Phase 1 Investigation Approach

The Phase 1 investigation field program is summarized on Table 1. A summary of the analytical testing and quality assurance / quality control program is summarized on Table 2. The primary objectives of the Phase 1 investigation are to determine the extent of identified soil and groundwater impacts in the identified target areas and characterize the contamination to support risk evaluation and/or waste disposal. Functionally, this plan is divided into a Soil Characterization Plan and a Groundwater Characterization Plan.

In summary, Phase 1 will involve the installation of 33 push probe borings in the six identified target areas to depths ranging from between 4 and 60 feet below ground surface (bgs). Screening-level groundwater samples will be collected from 6 of the push probe locations, all within the B-38 area (groundwater is expected to occur at depths of 20 to 24 feet bgs depending on the time of year). Selected soil and groundwater samples will be analyzed for the identified chemicals of interest appropriate for each target area.

3.3 Soil Characterization Plan

This section, describing the proposed Phase 1 investigation activities relating to soil characterization, is subdivided by target area. The proposed Phase 1 soil sampling program is summarized on Table 3. In general, soil samples will be selected for laboratory analysis at pre-determined depths that correspond to depths of previously-identified contamination. Additional samples may be chosen based on field screening indicators, the likelihood of contamination, and analytical results as they become available. Due to redevelopment issues, an effort will be made to define the extent of on-site soil impacts in each target area to non-detect levels such that the Port can better evaluate potential cleanup options.

3.3.1 B-5 Area

Previous investigations in the vicinity of B-5 have determined the lateral and vertical extent of oil-range petroleum impacts in this area. However, one push probe (B-52) will be installed in this area to a depth of 4' bgs to collect petroleum constituent and waste characterization parameters. It is expected that one soil sample collected at a depth of 2' bgs at B-5 will be analyzed for VOCs, PAHs, PCBs and 13 priority pollutant total metals.

Since a storm sewer runs in the near vicinity of petroleum impacts detected at B-5, a second push probe (B-83) will be installed to determine if the storm line has served as a source of, or a pathway for the identified petroleum impacts. The depth of the storm sewer line is not known at this time; however construction documents on file at the Port indicate that sewer lines at the Terminal 1 facility could run as deep as approximately 9 feet bgs. The B-5 area is drained by four catch basins. Accordingly, B-83 will be installed to an estimated depth of 12 feet bgs located in an area down-gradient of the four catch basins and in the vicinity of B-5. It is expected that one selected soil sample collected at a depth as deep as or deeper than

the four catch basins will be analyzed for diesel-range and oil-range petroleum hydrocarbons (TPH-Dx).

3.3.2 B-8 Area

At DEQ's request, the sediments at the former base of former Slip No. 1 will be evaluated for selected COPCs, principally TBT. Based on the Draft PA (Bridgewater 2000), the former slip was filled in approximately 1971, and the presence of TBT in sediments cannot be ruled out. Although the former depth of Slip No. 1 is not known, it is assumed to be similar to that of Slip No. 2 at the time of construction in 1923 at a depth of approximately 55 feet bgs [approximately -35 feet mean sea level (msl)]. Based on HAI's review of aerial photographs dated 1963, 1961, 1957, 1955, and 1940 on file at the Army Corps of Engineers (ACOE) for the Terminal 1 South facility, it appears that the southeastern side of the slip may have been utilized more frequently for the moorage of vessels.

One push probe (B-84) will be installed near boring B-8 to a depth of approximately 60 feet bgs (approximately -40 feet msl). One soil sample will be selected based on stratigraphic changes that suggest the former base of Slip No. 1 and the top of former Willamette River sediments. If stratigraphic changes are not identified, the push probe may be installed to greater depths. One soil sample will be selected and analyzed for diesel-range and oil-range petroleum hydrocarbons, PAHs, PCBs, 13 priority pollutant total metals, and TBT.

3.3.3 B-20 Area

Previous investigation indicates that low levels [36 parts per million (ppm)] of diesel-range TPH were identified in the vicinity of the former gear locker at B-20. The proposed investigation in this area is designed to determine the extent of the petroleum impacts, and collect petroleum constituent and waste characterization parameters.

Five push probes (B-53 through B-57) will be installed to a depth of 4 feet bgs in the area to characterize the previously identified soil impacts at B-20. B-53 will be installed at the location of B-20 for collection of waste profiling samples and to determine the vertical extent of contamination. B-54 through B-57 will be installed in a radial pattern approximately 15 feet from B-20 to determine the lateral extent of soil impacts.

The soil sample at 4 feet bgs in B-53, and at 1 foot bgs in B-54 through B-57, will be analyzed for diesel-range petroleum hydrocarbons (TPH-Dx). In addition, a 1 foot sample at boring B-53 will be analyzed for VOCs, PAHs, PCBs, and 13 total metals.

Based on field screening observations, additional push probes, other than those currently proposed, may be installed during this phase of investigation such that the extent of soil impacts may be completely defined during this phase of investigation. A discussion of field screening criteria is included in the SAP (Appendix A). Any additional push probes would be installed in accordance with the SAP (Appendix A).

3.3.4 B-29 Area

Previous investigation indicates that low levels (67 ppm) of oil-range TPH were identified in the vicinity of the railroad pit at B-29. The proposed investigation in this area is designed to determine the extent of the petroleum impacts, and collect additional waste characterization parameters.

Five push probes (B-58 through B-62) will be installed in the area to characterize the extent of previously identified soil impacts at B-29. Boring B-58 will be installed at the location of B-29 for the collection of waste profiling samples and to determine the vertical extent of contamination. Borings B-59 through B-62 will be installed in a radial pattern approximately 15 feet from B-29 to determine the lateral extent of soil impacts.

The soil sample at 8 feet bgs in B-58, and at 4 feet bgs in B-59 through B-62, will be analyzed for diesel-range petroleum hydrocarbons (TPH-Dx). In addition, the 4 foot bgs sample at boring B-59 will be analyzed for PAHs, PCBs, and 13 total metals.

Based on field screening observations, additional push probes, other than those currently proposed, may be installed during this phase of investigation such that the extent of soil impacts may be completely defined during this phase of investigation. A discussion of field screening criteria is included in the SAP (Appendix A). Any additional push probes would be installed in accordance with the SAP (Appendix A).

3.3.5 B-37 Area

B-37 was installed next to a dry well, where low levels (300 ppm) of oil-range petroleum hydrocarbons were detected. Previous investigations indicate that the bottom of the dry well is located at a depth of approximately 9 feet bgs. The proposed investigation in this area is designed to determine the lateral and vertical extent of the detected petroleum impacts and collect additional constituent parameters.

Five push probes (B-63 through B-67) will be installed in the area to characterize the extent of previously identified soil impacts at B-37. Boring B-63 will be installed through the bottom of the dry well for the collection of waste profiling samples and to determine the vertical extent of contamination. Borings B-64 through B-67 will be installed in a radial pattern approximately 15 feet away from B-37 to determine the lateral extent of soil impacts.

Soil samples at 16 feet bgs in B-63 will be analyzed for oil-range petroleum hydrocarbons, and at 10.5 feet bgs for PAHs, PCBs, and 13 total metals (Table 3). Based on knowledge of process and field screening of soil samples from boring B-37, the DEQ has indicated that surface soils (0-3 feet bgs) in the vicinity of the dry well can be ruled out as having been impacted. In addition, soil from B-64, B-65, B-66, and B-67 will be analyzed for oil-range petroleum hydrocarbons. Soil samples at a depth of 10.5 feet bgs in B-64, B-65, and B-66 will be selected for analysis; the soil sample collected at 14.5 feet bgs in B-67 will be selected to adjust for the increased elevation of the loading dock where it will be placed.

Based on field screening observations, additional soil probes, other than those currently proposed, may be installed during this phase of investigation such that the extent of soil impacts may be completely defined during this phase of investigation. A discussion of field screening criteria is included in the SAP (Appendix A). Any additional push probes would be installed in accordance with the SAP (Appendix A).

3.3.6 B-38 Area

Elevated concentrations of diesel-range and oil-range petroleum hydrocarbons [up to 34,000 parts per million (ppm) and 1,600 ppm] were detected in the B-38 area at depths ranging from 2.5 to 26 feet bgs (Figure 4). The vertical extent of the petroleum impacts appears to have been determined by previous investigations. Lead was detected in one soil sample at an elevated concentration (807 ppm). The source or sources of the petroleum impacts in this area remain unknown. Historical research indicates that this area has been filled and was the former location of a covered pier. The proposed investigation in this area is designed to determine the extent of the detected petroleum impacts and collect additional waste characterization parameters.

Fifteen push probes (B-68 through B-82) will be installed in the B-38 area to characterize the extent of previously identified soil and groundwater impacts. Push probe B-80 will be installed between the locations of B-38 and B-39 for the collection of waste profiling samples. Push probes B-68 through B-79, and B-81 and B-82 will be installed in locations to determine the lateral extent of soil impacts. Push probes B-81 and B-82 will serve a dual purpose in that they will be located near NW Front Avenue relative to B-38. In addition, push probes B-74 through B-79 will be utilized for the collection of screening level groundwater samples: soil samples will only be analyzed if field screening indicates possible contamination. In the event that free-phase product is observed in soil samples collected at or below the depth of water, then groundwater samples will be analyzed for PCBs. Soil sample intervals and constituent parameters vary depending on location and previous site characterization results with samples generally collected within each boring at the following depth intervals: 2.5 feet bgs, 10-12.5 feet bgs, and 18-20 feet bgs and analyzed for diesel-range and oil-range petroleum hydrocarbons, and PAHs. Additional samples will be selected for VOCs, PCBs, and 13 total metals depending on TPH-Dx result. A detailed presentation of the soil sampling program is presented on Table 3.

Based on field screening observations, additional push probes, other than those currently proposed, may be installed during this phase of investigation such that the extent of soil impacts may be completely defined during this phase of investigation. A discussion of field screening criteria is included in the SAP (Appendix A). Any additional push probes would be installed in accordance with the SAP (Appendix A).

3.3.7 Phase 2 Soil and Groundwater Characterization

In the event that the full extent of soil and/or groundwater impacts at the site are not defined during the Phase 1 site characterization activities, an additional phase (Phase 2) of investigation may be conducted. If deemed necessary, a plan for Phase 2b work activities will be submitted in addendum form to the Port for approval prior to initiation. Subsequently, work activities will be completed in accordance with this Work Plan and any additional procedures detailed in the addendum.

3.4 Groundwater Characterization Plan

The groundwater characterization plan has two components: 1) screening-level groundwater sampling during push probe investigatory activities (Phase 1), and 2) groundwater monitoring well installation activities (Phase 2), if necessary. The primary objectives of the Phase 1 groundwater investigation is to determine the extent of groundwater impacts identified in the vicinity of the B-38 area.

3.4.1 Screening-Level Groundwater Samples (Phase 1)

The proposed Phase 1 groundwater sampling program is summarized on Table 4. Screening-level groundwater samples will be collected at 6 pre-determined push probe locations from the uppermost groundwater at the site. No vertical profiling of the groundwater is proposed at this time. The selected push probes will be advanced 5 to 10 feet below the water table for groundwater sample collection from a 4-foot screen. Since seasonal water table fluctuations of up to 12 to 15 feet may occur at the site, the actual depth of sample collection may vary, but is estimated to be between the depths of 24 to 28 feet bgs. The locations of proposed screening-level groundwater samples are shown on Figure 5.

All screening-level groundwater samples will be analyzed for VOCs, PAHs, DEHP, and 13 dissolved metals. In the event that free-phase product is observed in soil samples collected at or below the depth of water in the B-38 area, then groundwater samples will be analyzed for PCBs.

3.4.2 Groundwater Monitoring Well Installation (Phase 2)

Based on the results of screening-level groundwater sampling, the Port's selected cleanup option for this area, and DEQ input, a monitoring well network may be designed and installed at the site for the purpose of monitoring hydrology and groundwater quality in the B-38 area. The actual monitoring well network, if necessary, will not be determined until the results of the push probe investigations are received and evaluated. Conceptually the groundwater monitoring well network would likely consist of 4 shallow-zone groundwater monitoring wells to depths of approximately 30 feet bgs.

Prior to any monitoring well network installation, an addendum to the SCP describing the locations and depths of the proposed monitoring wells will be submitted to the Port and DEQ for review and approval. The SCP addendum will also include a plan for the routine monitoring of the installed wells.

4 BENEFICIAL USE DETERMINATION PLAN

A Beneficial Use Determination (BUD) will be completed such that land uses as well as current and future likely beneficial uses of water in the locality of the T1 South facility may be identified. The determination will be conducted to ensure that appropriate exposure scenarios and remedial alternatives may be selected based on contaminants at the site. The Beneficial Use report will be provided as a separate document from the Site Characterization report. In the event that a removal action is conducted in the areas of contamination a BUD may not be necessary.

4.1 Land Use Determination

4.1.1 Current Land Uses

The Beneficial Use Report will document current land uses at, and adjacent to, the T1 South site [including the entire locality of facility (LOF)]. Unless otherwise specified, sources for the information provided below will be the City of Portland Planning Department and include current zoning map(s) and the identification of conditional uses.

4.1.2 Reasonably Anticipated Future Land Uses

The Beneficial Use Report will document reasonably anticipated future land uses at, and adjacent to, the site (including the entire LOF). Unless otherwise specified, sources for the information provided below will be the Multnomah County or City of Portland Planning Departments. The Beneficial Use Report will detail the following:

- Land use regulations from likely governmental bodies having jurisdiction
- The Port of Portland's plans for facility land use and/or the potential purchaser's plans for the site redevelopment
- Adjacent property owner's plans for use of their properties (including water use) and their interest and/or concerns in uses of T1 South as well as general area development (via telephone contact and/or survey mailing to property owners). The preceding will include all property owners located within the LOF
- Local planning agencies Comprehensive Plan or any pending zoning modifications for the vicinity of T1 South

4.2 Beneficial Uses of Water

An accurate understanding of the LOF is necessary such that the scope of the Beneficial Water Use Survey will be sufficient to describe current or likely future water uses where human or ecological receptors may contact, or are reasonably likely to come into contact with, facility related hazardous substances. In addition, other available beneficial use surveys for the immediate area, such as the Hoyt Street Rail Yard and Union Station will be utilized to the extent practicable to streamline the beneficial use determination. A Conceptual Site Hydrogeologic Model will also be prepared as part of the Beneficial Water Use Survey.

4.2.1 Current Beneficial Uses of Water

The Beneficial Use Report will include the following:

- A review will be conducted of groundwater well records within one-half mile of the site available through the Oregon Water Resources Department (OWRD)
- A mailed or telephone survey to identify water uses for those properties located within the LOF, and to determine actual use for all wells for which logs are available within one-half mile down-gradient of the site and between the Willamette River

- The following information will be summarized, to the extent practical, for all located wells:
 - 1) Current Owner
 - 2) Map Location
 - 3) Driller
 - 4) Date of Construction
 - 5) Depth
 - 6) Casing and Screen Details
 - 7) Seal Conditions
 - 8) Current Water Use
 - 9) Static and Pumped Levels
 - 10) Approximate Land Surface Elevation
 - 11) Distance and Direction from the Site
 - 12) Reported Water Quality
- Surface water bodies located within the LOF will be identified and their uses determined
- A qualitative analysis of the likelihood of migration of contaminants of concern to wells and/or surface water bodies so as to significantly affect current beneficial uses will be conducted (This step may be performed at a later time as an element of risk characterization)
- Identification of reasonably available alternate water sources for any beneficial uses that would be adversely affected

4.2.2 Reasonably Likely Future Beneficial Uses of Water

Reasonably likely future uses of surface and groundwater in the LOF will be identified based on:

- Plans for expansion of existing land and water uses as determined through contacts with neighboring landowners, water suppliers, and contacts with government agencies
- Regulatory constraints involving future appropriations of surface and/or groundwater in the vicinity of the facility.
- An analysis of anticipated land development, as well as water use and population patterns/trends.
- Overall availability and suitability of ground and surface waters for beneficial uses.

- Identification of reasonably available alternate water sources for any likely future beneficial use that would be significantly adversely affected.
- General yield and natural water quality information will be obtained from available sources, if necessary, in order to evaluate the suitability of water within the LOF for beneficial uses.

5 PROJECT MANAGEMENT PLAN

5.1 Project Organization

The project management for implementation of the supplemental site characterization activities, including sampling and reporting tasks, will be undertaken by Hahn and Associates, Inc. (HAI). All project work will be supervised by an HAI Registered Geologist.

Property Owner

Port of Portland
P. O. Box 3529
Portland, Oregon 97208
Contact: Mr. Bill Bach (503) 944-7525

Project Management

Port of Portland

Port of Portland
P. O. Box 3529
Portland, Oregon 97208
(503) 944-7533
Contact: Mr. Joe Mollusky

Oregon Department of Environmental Quality (DEQ)

Oregon DEQ
2020 SW 4th Avenue, Suite 400
Portland, Oregon
Portland, Oregon 97201-4987
Telephone number: to be determined
Contact: to be determined

Work Plan for Supplemental Site Characterization
Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon

Page 15 of 16
Project No. 5106
August 31, 2000

Hahn and Associates, Inc.

Hahn and Associates, Inc.
434 NW Sixth Avenue, Suite 203
Portland, Oregon 97201
(503) 796-0717
Contact: Mr. Guy Tanz, Associate

Drilling Services

Geo-Tech Explorations, Inc.
19700 SW Teton
Tualatin, Oregon 97062
(503) 692-6400
Contact: Mr. Bill Klosterman

Laboratory Services

Columbia Analytical Services
1317 South 13th
Kelso, Washington 98626
(503) 295-1934
Contact: Mr. Harvey Jacky

Surveying Services

Port of Portland
P. O. Box 3529
Portland, Oregon 97208
(503) 944-7393
Contact: Mr. Chuck Wiley

Utility Locate Services

Locates Down Under
15725 SE Hanwood Lane
Milwaukie, Oregon 97267
(503) 654-2637
Contact: Mr. Carson Smith

HAHN AND ASSOCIATES, INC.

POPT1S604969

5.2 Project Schedule

Work activities will begin as soon as possible following approval of this Work Plan by the Port of Portland. The activities outlined in this Work Plan are anticipated to take approximately 2 months to complete, including preparation of a draft Supplemental Site Characterization report. A final Supplemental Site Characterization report can be provided within 2 weeks following receipt of Port of Portland comments assuming additional field activities are not necessary. In addition, if necessary, a BUD report can be completed within a similar schedule. A more definitive schedule regarding Work Plan implementation and subsequent phases of investigation and/or remediation will be provided as an addendum to this Work Plan.

5.3 Reporting

Upon receipt of the analytical data, the results of the investigation activities will be included in a comprehensive report for the site. The report will include an accurate site map showing the sample locations, a description of the hydrogeologic conditions encountered, a representation of the vertical and horizontal distribution of any contamination encountered, and the analytical results. Concentrations of contaminants detected in the samples, if any, will be reported in tabular form as will details of soil borings and field screening. The appendix of the report will include laboratory analytical reports, and chain-of-custody documentation.

5.4 Work Plan Addendum Procedure

If necessary, additional work activities beyond the scope of this Work Plan will be submitted in addendum form to the Port of Portland for approval prior to initiation. Subsequently, work activities will be completed in accordance with this Work Plan and any additional procedures detailed in the addendum.

GLOSSARY OF ABBREVIATIONS

bgs	below existing ground surface
Bridgewater	Bridgewater Group, Inc.
BTEX	benzene, toluene, ethylbenzene, and xylene
COPCs	contaminants of potential concern
DEHP	bis(2-ethylhexyl)phthalate
DEQ	Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
ESA	environmental site assessment
HAI	Hahn and Associates, Inc.
IDW	investigative-derived waste
LOF	locality of facility
MFA	Maul Foster and Alongi, Inc.
msl	mean sea level
NAPL	non-aqueous phase liquid
N W	northwest
OWRD	Oregon Water Resources Division
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
the Port	the Port of Portland
ppm	parts per million
QA	quality assurance/
QC	quality control
SCP	Site Characterization Plan
SAP	Sampling and Analysis Plan
TBT	tributyl tin
TPH	total petroleum hydrocarbons
TPH-Dx	diesel-range petroleum hydrocarbons
VOCs	volatile organic compounds

HAHN AND ASSOCIATES, INC.

POPT1S604971

TABLE 1
Phase 1 Site Characterization Field Program Summary

Work Plan for Supplemental Site Characterization
 Marine Terminal 1 South
 2100 NW Front Avenue
 Portland, Oregon

HAI Project No. 5106

Area of Investigation	Description	Proposed Push Probe Borings	Number of Push Probe Borings	Number of Push Probe Borings with Soil Samples	Initial Number of Near-Surface Soil Samples ¹ (0-2.5 feet bgs)	Initial Number of Subsurface Soil Samples ¹	Number of Screening-Level Groundwater Sample Locations
B-5 Area	Between House No. 104 and Warehouse No. 2	B-52 and B-83	2	2	1	1	0
B-8 Area	Former Slip No. 1	B-84	1	1	0	1	0
B-20 Area	Northwest end of site near former gearlocker and Slip No. 2	B-53 through B-57	5	5	5	1	0
B-29 Area	Inside Warehouse No. 102	B-58 through B-62	5	5	0	6	0
B-37 Area	Dry well between House No. 104 and Warehouse No. 2	B-63 through B-67	5	5	0	7	0
B-38 Area	West End Open Storage Area	B-68 through B-82	15	10	9	18	6
Totals -->			33	28	15	34	6

bgs = below ground surface

1 = Additional samples may be selected for analysis based on field screening indicators or initial analytical results

TABLE 2

Phase 1 Analytical Testing Summary

Work Plan for Supplemental Site Characterization

Marine Terminal 1 South

2100 NW Front Avenue

Portland, Oregon

HAI Project No. 5106

Area of Investigation	Investigative Method	Number of Borings	Sample Matrix	Analytical Parameters	Tentative Number of Soil Samples to be Analyzed				
					Investigative Samples	Field QA/QC Samples			Matrix Total
						Duplicate	Trip Blank	Equipment Blank	
B-5 Area	Push Probe	2	Soil	TPH-Dx	1				1
				VOCs	1				1
				PAHs	1				1
				13 Metals	1				1
				PCBs	1				1
B-8 Area	Push Probe	1	Soil	TPH-Dx	1				1
				PAHs	1				1
				13 Metals	1				1
				PCBs	1				1
				TBT	1				1
B-20 Area	Push Probe and Rotohammer	5	Soil	TPH-Dx	5				5
				VOCs	1				1
				PAHs	1				1
				13 Metals	1				1
				PCBs	1				1
B-29 Area	Push Probe	5	Soil	TPH-Dx	5				5
				PAHs	1				1
				13 Metals	1				1
				PCBs	1				1
B-37 Area	Push Probe	5	Soil	TPH-Dx	6	1			7
				PAHs	1				1
				13 Metals	1				1
				PCBs	1				1
B-38 Area	Push Probe	10	Soil	TPH-Dx	27	2			29
				VOCs	5	1			6
				PAHs	27	2			29
				13 Metals	5	1			6
				PCBs	5	1			6
		6	Groundwater	VOCs	6	1	1		8
				PAHs	6	1		1	8
				DEHP	6	1	1	1	9
				13 Metals	6	1		1	8
				PCBs	up to 6	1 if necessary		1 if necessary	up to 6

Note:

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene, and xylene

DEHP = bis(2-ethylhexyl)phthalate

PAHs = polynuclear aromatic hydrocarbons

PCBs = polychlorinated biphenyls

QA/QC = quality assurance / quality control

TBT = tributyl tin

TPH-Dx = diesel and oil-range total petroleum hydrocarbons

VOCs = volatile organic compounds

TABLE 3

Proposed Phase 1 Soil Sampling Program

Work Plan for Supplemental Site Characterization

Marine Terminal 1 South

2100 NW Front Avenue

Portland, Oregon

HAJ Project No. 5106

Area	Push Probe Boring Numbers	Proposed Boring Depths (feet bgs)	Collect Groundwater Sample	Tentative Number of Soil Samples to be Analyzed	Soil Sample Method	Tentative Soil Samples Selected for Analysis (feet bgs)	Analytical Parameters
B-5 Area	B-52 (At B-5)	4	No	1	Continuous Soil Core	2'; others based on field screening	VOCs, PAHs, PCBs, 13 total metals
	B-83 (down-gradient of stormsewer catch basins)	8		1	Continuous Soil Core	Based on depth of catch basin and stormsewer line (estimated 4' - 6'); others based on field screening	TPH-Dx
B-8 Area	B-64 (near B-8)	60	No	1	Continuous Soil Core	Based on depth of former bottom of slip estimated at 65'; others based on field screening	TPH-Dx, PAHs, PCBs, 13 total metals, TBT
B-20 Area	B-63 (At B-20)	4	No	2	Continuous Soil Core	1' and 4'; others based on field screening	VOCs, PAHs, PCBs, 13 total metals at 1' TPH-Dx at 4'
	B-54, B-55, B-56, and B-57	4		4		1'; others based on field screening	TPH-Dx
B-29 Area	B-58 (At B-29)	8	No	2	Continuous Soil Core	4' and 8'; others based on field screening	PAHs, PCBs, and 13 total metals at 4' TPH-Dx at 8'
	B-59, B-60, B-61, and B-62	8		4		4'; others based on field screening	TPH-Dx
B-37 Area	B-63 (At B-37)	20	No	3	Continuous Soil Core	5, 10.5', and 16'; others based on field screening	PAHs, PCBs, and 13 total metals at 10.5' TPH-Dx at 5' and 16'
	B-64, B-65, and B-66	16		3		10.5'; others based on field screening	TPH-Dx
	B-67 (on loading dock)	20		1		14.5'; others based on field screening	TPH-Dx
B-38 Area	B-68	20	No	2	Continuous Soil Core	2.5' and 10'; others based on field screening	TPH-Dx' and PAHs
	B-69	28		3		2.5', 10', and 20'; others based on field screening	TPH-Dx' and PAHs
	B-70	28		3		2.5', 10', and 20'; others based on field screening	TPH-Dx' and PAHs
	B-71	28		3		2.5', 10', and 20'; others based on field screening	TPH-Dx' and PAHs
	B-72	28		3		2.5', 12.5', and 20'; others based on field screening	TPH-Dx' and PAHs
	B-73	28		3		2.5', 12.5', and 18'; others based on field screening	TPH-Dx' and PAHs
	B-74	28		3		2.5', 12.5', and 18'; others based on field screening	TPH-Dx' and PAHs
	B-75 through B-79	28	No	0		Based on field screening	TPH-Dx and PAHs
	B-80	12		1		10'	VOCs and 13 total metals
	B-81	20		3		2.5', 10', and 20'	TPH-Dx' and PAHs
	B-82	20		3		2.5', 10', and 20'	TPH-Dx' and PAHs

Note:

bgs = below ground surface

PAHs = polynuclear aromatic hydrocarbons

PCBs = polychlorinated biphenyls

TBT = tributyl tin

TPH-Dx = TPH method for diesel- and oil-range petroleum hydrocarbons

VOCs = volatile organic compounds

1 = The highest 4 concentrations of TPH-Dx at B-68 through B-74, and B-81 and B-82 will be analyzed for VOCs, 13 Metals, and PCBs

TABLE 4**Proposed Phase 1 Groundwater Sampling Program: Screening-Level Groundwater Samples**

Work Plan for Supplemental Site Characterization

Marine Terminal 1 South

2100 NW Front Avenue

Portland, Oregon

HAI Project No. 5106

Area	Push Probe Boring Numbers	Proposed Boring Depths (feet bgs)	Estimated Screen Interval (feet bgs)	Tentative Number of Groundwater Samples to be Analyzed	Analytical Parameters
B-38 Area	B-74 through B-79	28	24 - 28	6	PAHs, DEHP, VOCs, 13 Dissolved Metals; collect and hold for PCBs

Note:

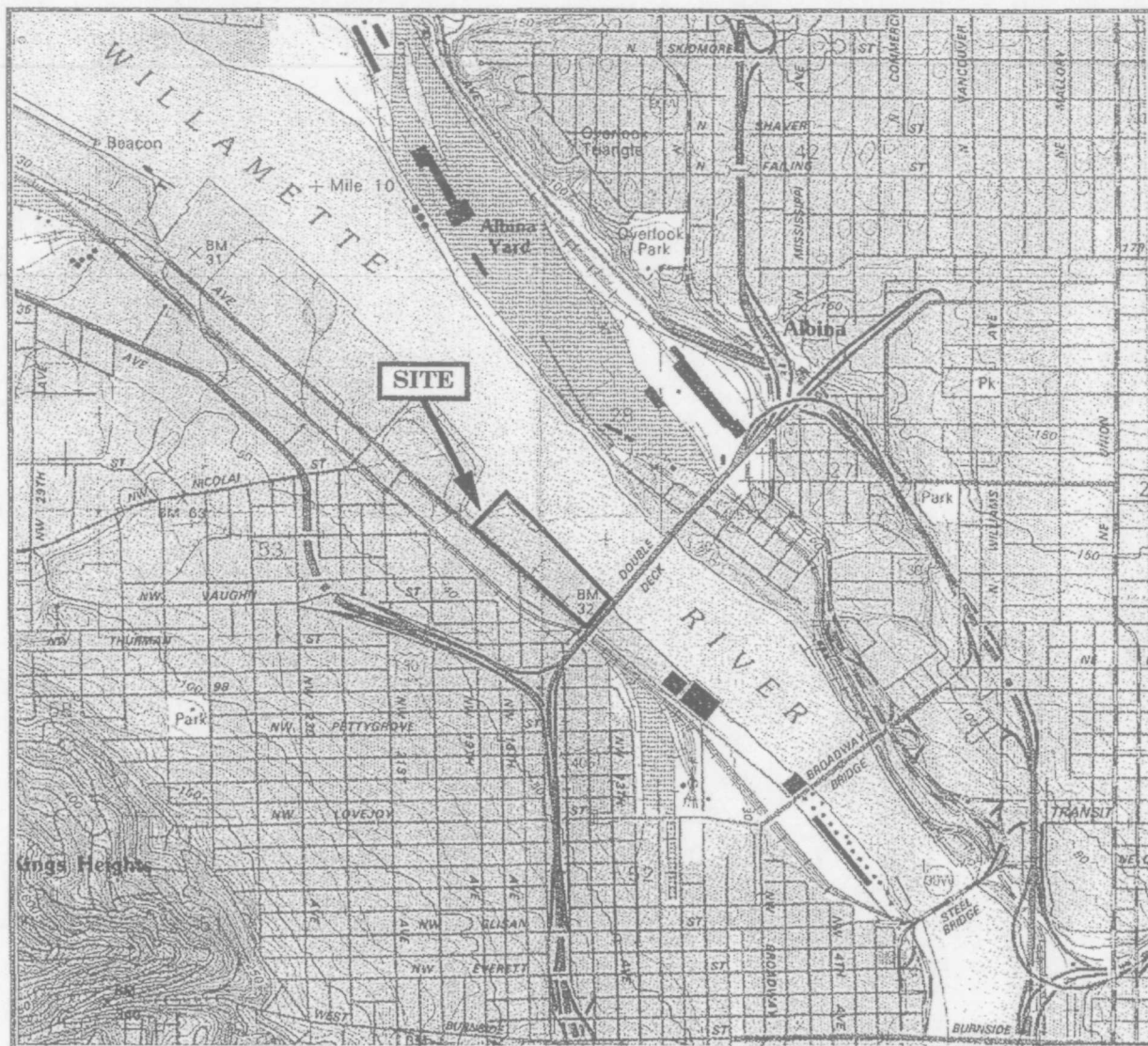
bgs = below ground surface

DEHP = bis(2-ethylhexyl)phthalate

PAHs = polynuclear aromatic hydrocarbons

PCBs = polychlorinated biphenyls

VOCs = volatile organic compounds



Note: Base Map from the Portland, Oregon USGS 7.5 Minute Quadrangle, 1990, Contour Interval: 10 Feet

HAI Project No. 5106	HAHN AND ASSOCIATES INCORPORATED	Location Map	FIGURE 1
August 2000	ENVIRONMENTAL MANAGEMENT 434 NW SIXTH AVENUE, SUITE 203 PORTLAND, OREGON 97209 503/796-0717	Work Plan for Supplemental Site Characterization Marine Terminal 1 South 2100 NW Front Avenue Portland, Oregon	

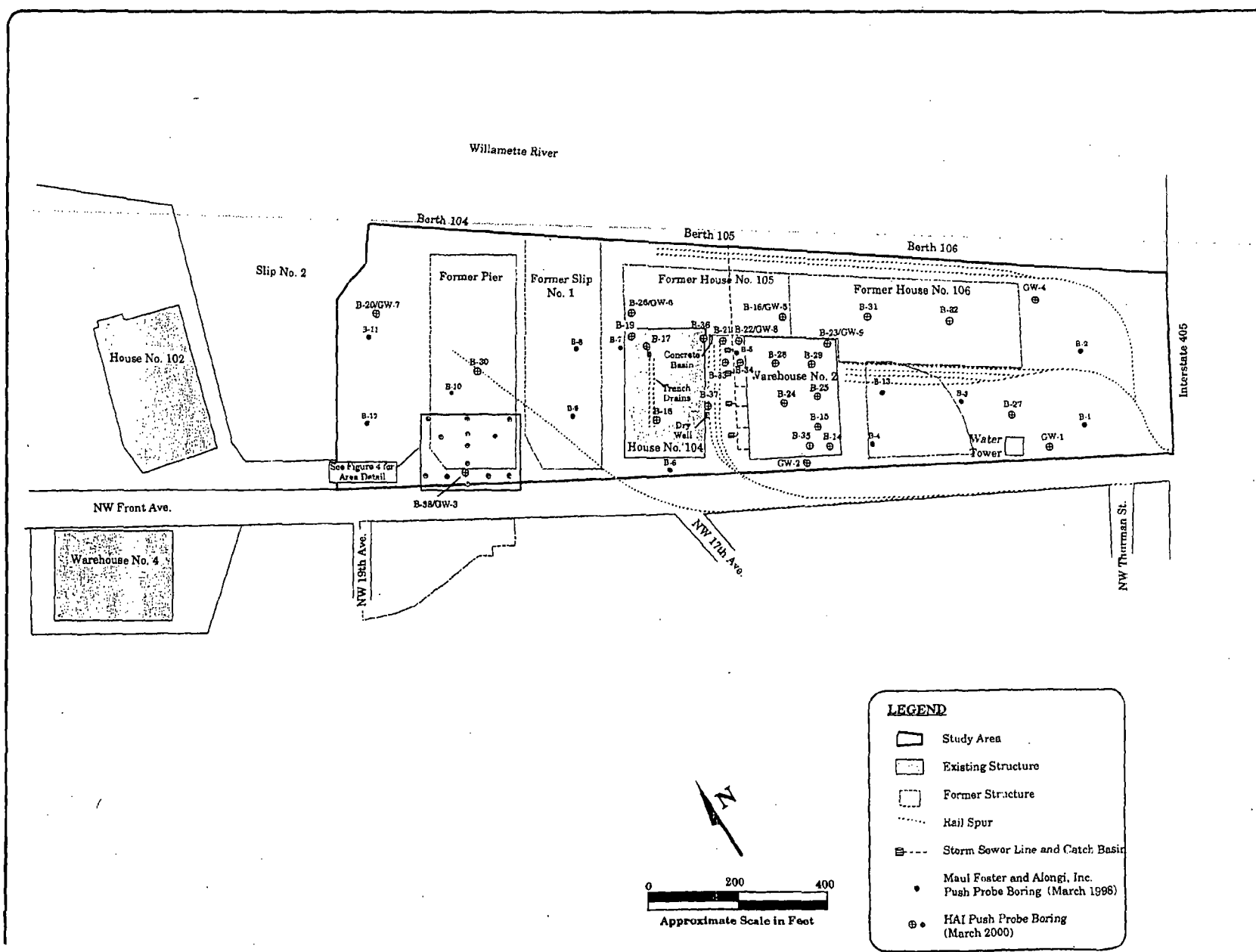


Figure
2

Site Map

**Work Plan
for Supplemental Site Characterization
Port of Portland Marine Terminal 1
2100 NW Front Avenue
Portland, Oregon**

HAHN AND ASSOCIATES, INC.

ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
PORTLAND, OREGON 97209
(503) 796-0717

August 2000

HAI Project No.
5106

Petroleum Hydrocarbons in Soil

Work Plan
for Supplemental Site Characterization
Port of Portland Marine Terminal 1
2100 NW Front Avenue
Portland, Oregon

HAHN AND ASSOCIATES, INC.

ENVIRONMENTAL MANAGEMENT
 434 NW SIXTH AVENUE, SUITE 203
 PORTLAND, OREGON 97209
 (503) 796-0717

August 2000

HAI Project No.
5106

Figure

4

Push-Probe Soil Sample Locations
- B-38 Area

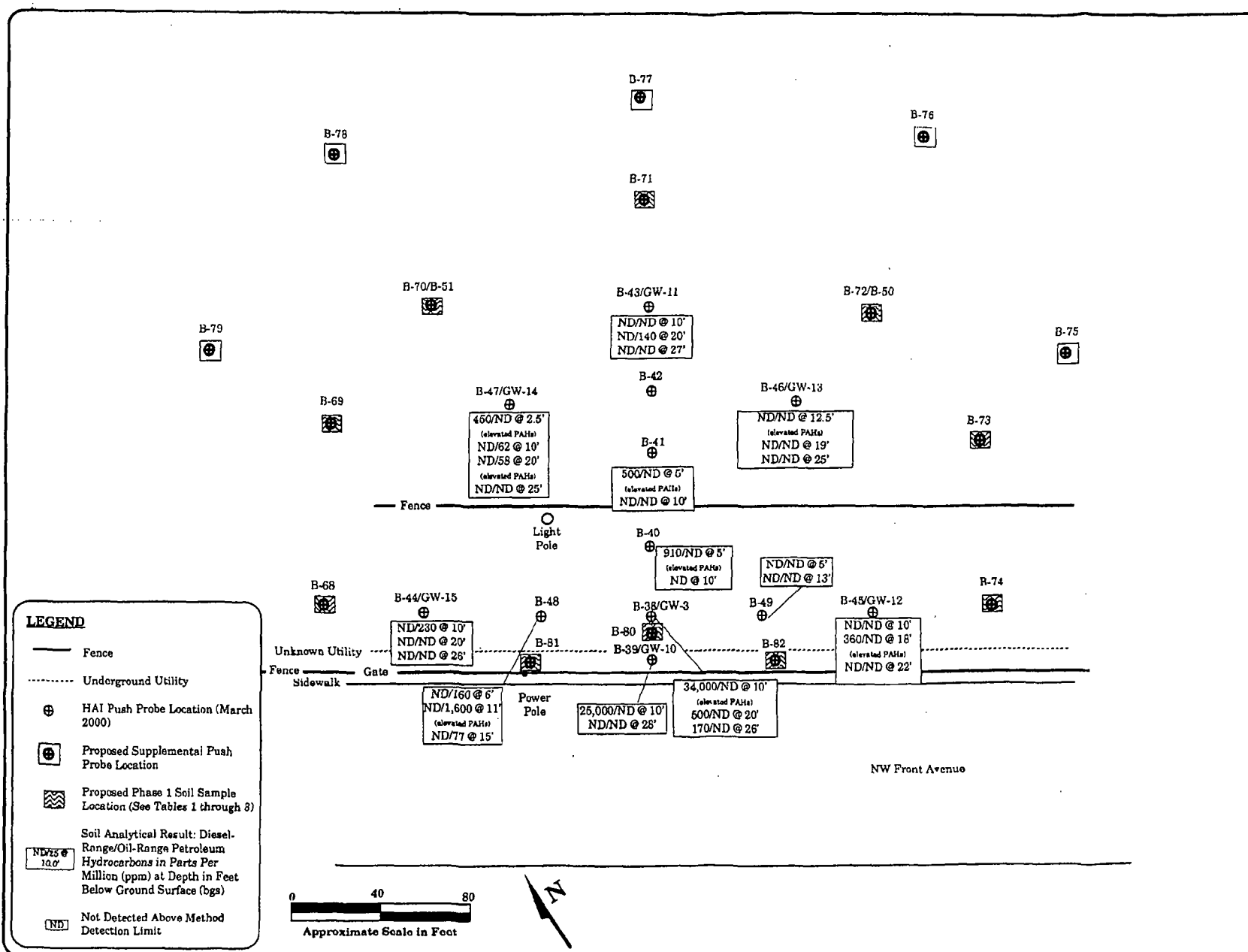
Work Plan
for Supplemental Site Characterization
Port of Portland Marine Terminal 1
2100 NW Front Avenue
Portland, Oregon

HAHN AND ASSOCIATES, INC.

ENVIRONMENTAL MANAGEMENT
434 NW SIXTH AVENUE, SUITE 203
PORTLAND, OREGON 97209
(503) 796-0717

August 2000

HAI Project No.
5106



POPT1S604979

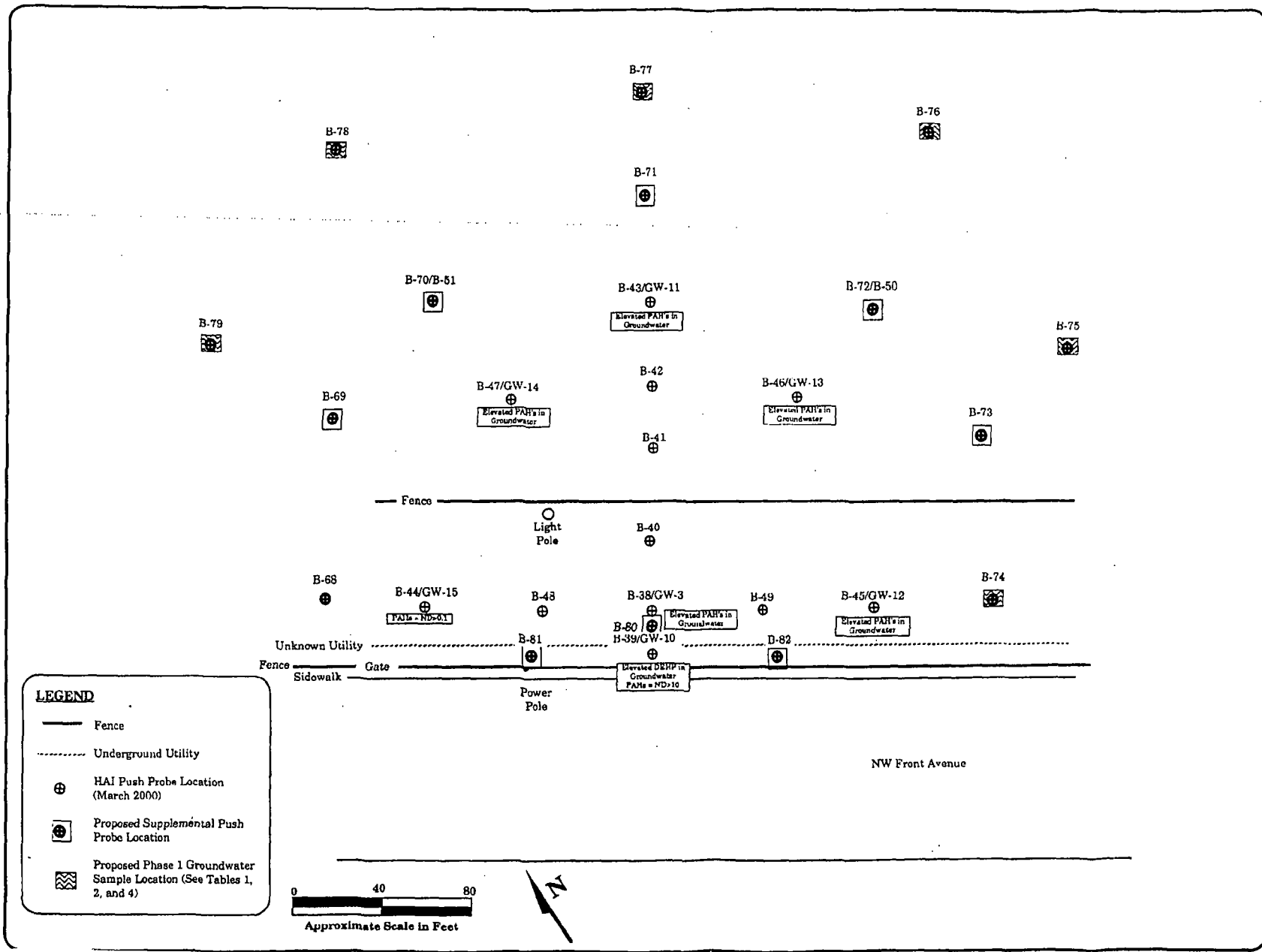


Figure 5	
Push-Probe Groundwater Sample Locations - B-38 Area	Work Plan for Supplemental Site Characterization Port of Portland Marine Terminal 1 2100 NW Front Avenue Portland, Oregon
HAHN AND ASSOCIATES, INC. ENVIRONMENTAL MANAGEMENT 434 NW SIXTH AVENUE, SUITE 203 PORTLAND, OREGON 97209 (503) 796-0717	
August 2000	
HAI Project No. 5106	

SAMPLING AND ANALYSIS PLAN

**Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon**

August 31, 2000

Prepared for:

**The Port of Portland
Portland, Oregon**

Prepared by:

**Hahn and Associates, Inc.
Portland, Oregon**

Project No. 5106

TABLE OF CONTENTS

1. INTRODUCTION.....	1
2. INVESTIGATION METHODS.....	1
2.1 Soil Boring Installation Procedures.....	2
2.1.1 Push-Probe Borings.....	2
2.1.2 Drilled Soil Borings.....	2
2.1.3 Hand Auger Soil Borings.....	2
2.2 Soil Boring Abandonment Procedures.....	2
2.3 Test Pit Installation and Abandonment Procedures.....	3
2.4 Monitoring Well Construction.....	3
2.4.1 Drilled Monitoring Well Construction.....	3
2.4.2 Push Probe Monitoring Well Construction.....	4
2.4.3 Monitoring Well Surface Completion.....	4
2.5 Monitoring Well Development.....	4
2.6 Field Measurements.....	4
2.7 Analytical Methods and Procedures.....	5
2.8 Land Surveying.....	6
3. SOIL SAMPLING PROCEDURES.....	6
3.1 Soil Sample Collection Procedures.....	6
3.1.1 Drilled Soil Borings.....	7
3.1.2 Push Probe Borings.....	7
3.1.3 Hand Auger Borings.....	8
3.1.4 Test Pits.....	8
3.2 Soil Sample Description.....	8
3.3 Soil Field Screening Procedures.....	9
4. GROUNDWATER SAMPLING PROCEDURES.....	9
4.1 Screening-Level Groundwater Samples from Temporary Well Points.....	9
4.2 Screening-Level Groundwater Samples from Push Probe Borings.....	10
4.3 Groundwater Samples from Monitoring Wells.....	10
4.4 Water Level Monitoring.....	10
5. DECONTAMINATION PROCEDURES.....	11
6. INVESTIGATIVE DERIVED WASTE (IDW).....	11
7. QUALITY ASSURANCE (QA)/QUALITY CONTROL (QC).....	11
7.1 Quality Control Samples.....	11
7.2 Sample Handling Procedures.....	12
7.2.1 Sample Containers.....	12
7.2.2 Sample Labels.....	12
7.2.3 Chain-of-Custody Record and Shipment.....	13
7.3 Documentation Procedures.....	14
7.4 Equipment Calibration and Maintenance Procedures.....	14
7.5 Data Reduction and Validation.....	14

GLOSSARY OF ABBREVIATIONS

TABLE OF CONTENTS
(continued)

TABLES

B1 Sample Container, Preservation, and Holding Time Requirements

ATTACHMENTS

A Example Field Logs and Forms

SAMPLING AND ANALYSIS PLAN

- Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon

August 31, 2000

1. INTRODUCTION

This Sampling and Analysis Plan (SAP) is designed to cover all potential phases of Site characterization and investigation activities conducted in upland areas of the Site. Since the extent of subsequent phases, if necessary, is not known, this SAP includes a more comprehensive description of procedures and sampling methodologies than necessary for use as part of the Phase 1 Site Characterization activities. The more comprehensive SAP was developed in an effort to streamline any subsequent phases to the site characterization process. Procedures and/or methodologies proposed for use that are not included in this SAP, will be submitted in addendum form.

2. INVESTIGATION METHODS

A number of investigative methods may be used to collect soil and groundwater samples at the site. Subsurface soil samples will be collected from drilled soil borings, push probe borings, hand auger borings, and/or test pits. Screening-level groundwater samples will be collected from either temporary well points installed in drilled soil borings, or from drive points installed in push probe borings.

Soil samples will typically be collected at pre-determined locations that are chosen based on available information, as described in the Site Characterization Plan (SCP). These samples will be used to determine the nature and extent of contamination that has already been identified.

All investigation activities, where applicable, will be conducted in accordance with the Oregon Groundwater Law (Oregon Revised Statute (ORS) Chapter 537) and the Rules for Construction and Maintenance of Monitoring Wells and Other Holes in Oregon (Oregon Administrative Rules (OAR) Chapter 690, Division 240).

HAHN AND ASSOCIATES, INC.

POPT1S604984

2.1 Soil Boring Installation Procedures

Soil borings will be installed by any number of methods depending on soil type and equipment access. Typically, the first preference for soil boring installation will be by push probe techniques. In areas where soil types are not appropriate for push-probe methodology (i.e. in some gravelly or cemented soils), drilled borings can be installed by any number of methods. In areas where underground utilities are present and/or where only very shallow soil samples are required, hand auger borings may be installed.

2.1.1 Push-Probe Borings

A truck-mounted push probe unit that uses a 1.5-inch outside-diameter (OD) hydraulically-driven steel rod will be used to advance the proposed push probe soil borings. Soil and/or screening-level groundwater samples may be collected from these borings.

2.1.2 Drilled Soil Borings

In areas where soil types are not appropriate for push-probe methodology (i.e. in some gravelly or cemented soils), drilled borings can be installed by any number of methods. The soil types and proposed depths of investigation at this site are appropriate for use of hollow-stem auger drilling methodology. As such, drilled soil borings will be installed with a hollow stem auger drilling rig equipped with 4 1/4-inch inside-diameter (ID) auger. Soil borings with monitoring well installations would be completed with a hollow stem auger drilling rig equipped with 6 3/4-inch ID auger. The suitability of hollow stem auger installed borings will be evaluated in situations where non-aqueous phase liquids (NAPLs) are expected or encountered. To date, NAPLs have not been identified at the Site.

2.1.3 Hand Auger Soil Borings

Hand-augured soil borings will be installed manually with a stainless-steel hand auger equipped with a 2-inch OD hollow bit.

2.2 Soil Boring Abandonment Procedures

Following installation, each drilled boring, push probe, or hand auger boring will be backfilled with granular bentonite from the bottom of the hole to land surface. For borings with temporary well points, the well point will be pulled out of the hole and the sand pack drilled out prior to abandonment.

In areas of asphalt or concrete surface, the borings will be backfilled with bentonite chips to within 1.0 feet below ground surface (bgs) and capped with concrete to the land surface.

2.3 Test Pit Installation and Abandonment Procedures

Some areas may be investigated utilizing test pits. Shallow test pits will be installed utilizing a rubber-tire backhoe and/or excavator. Asphalt and/or concrete surfaces would be removed, and subsequently a test pit measuring approximately 3 feet wide by 8 feet long will be excavated to the depth of investigation, typically shallower than 15 feet bgs, depending on the size of equipment. Following completion, the test pit will be backfilled with the removed soil and compacted with the backhoe bucket in two-foot lifts and capped with 3/4-inch minus gravel or resurfaced with asphalt as necessary.

2.4 Monitoring Well Construction

All monitoring well installation activities will be conducted in accordance with the Oregon Groundwater Law (Oregon Revised Statute (ORS) Chapter 537) and the Rules for Construction and Maintenance of Monitoring Wells and Other Holes in Oregon (Oregon Administrative Rules (OAR) Chapter 690, Division 240).

2.4.1 Drilled Monitoring Well Construction

Drilled monitoring wells will be installed through 6 3/4-inch ID hollow stem augers. The monitoring wells will be constructed with 2-inch ID, threaded, schedule 40, polyvinyl chloride (PVC) blank casing and slotted screen. Typically, ten (10) feet of slotted screen will be set at the bottom of each borehole with blank casing extending to the ground surface.

A sand pack will be placed in the annular space from the bottom of the borehole to 3 feet above the top of the screen with a silica sand. The wells will then be developed with a surge block to set the sand pack. In shallow wells (less than 25 feet of water in the annular space), a well seal composed of 3/8-inch bentonite chips will be placed on top of the sand pack to a depth of about 2 feet bgs and hydrated.

For wells with over 25 feet of standing water in the annular space, the use of a grout-slurry mixture is required by the Oregon Water Resources Division (OWRD) in OAR 690-240-005 through 180. In such a case, a two-foot bentonite plug will be placed on top of the sand pack. The well seal, composed of a cement-bentonite slurry, will then be placed by a tremie pipe from the top of the bentonite plug to the within two feet of land surface.

Final well depths, screen intervals, sand pack and slot sizes, will be outlined in a Work Plan addendum, as necessary.

2.4.2 Push Probe Monitoring Well Construction

Push probe monitoring wells will be constructed with 3/4-inch ID and 2-inch OD schedule 40 PVC slotted screen and 3/4-inch blank casing. The well screen interval will consist of a 3/4-inch ID and 2-inch OD PVC pre-packed well screen. The annular space of the well screen will be pre-packed with silica sand that will be set at the bottom of each borehole. A well seal composed of bentonite chips will be placed on top of the pre-packed screen to a depth of 1 to 2 feet bgs and hydrated. Typically, ten (10) feet of well screen will be set at the bottom of each well with blank casing extending to the ground surface. Final well depths, screen intervals, sand pack and slot sizes, will be outlined in a Work Plan addendum, as necessary.

2.4.3 Monitoring Well Surface Completion

In general, monitoring wells will be completed with flush well monuments cemented in at the surface. However, there may be instances where above-ground monuments will be advantageous, and as such, their suitability will be evaluated while in the field. Above-ground monuments will also require the installation of three surrounding guard posts. The well casings will be fitted with locking caps.

2.5 Monitoring Well Development

At least 24 hours following installation, monitoring wells will be further developed. The wells will be developed by purging with a peristaltic pump in an attempt to remove the fine sediment from around the installations borehole. During development, at least 10 volumes of water will be removed from each well. The parameters pH, temperature, and conductivity will be measured during the development process. The installations will be considered developed when the parameters of pH, temperature, and conductivity have stabilized and the water does not appear turbid. Stabilization is considered to have been met when the last three measured values for each of the above parameters are within 10 percent of each other and the water appears clear to the eye.

2.6 Field Measurements

Field instruments are used to screen for organic vapors, to measure water for parameters that help ensure collection of representative groundwater samples, and to measure water levels in wells.

A photoionization detector (PID) will be used to screen for headspace vapors from collected soils samples (see Section 3.4). Organic vapor concentration measurements will be

conducted utilizing a MicroTIP Model MP-1000 equipped with a PID and a 10.6 electron volt (eV) lamp.

During purging of wells prior to sample collection, the temperature, pH, and conductivity of the water is measured to monitor for stabilization. The temperature, pH, and conductivity will be measured with a Hydac probe.

If necessary, turbidity and dissolved oxygen can also be measured on water samples in the field. Turbidity will be measured with a LaMotts Model 2008 turbidity meter. Dissolved oxygen will be measured with a YSI Incorporated Model 55 dissolved oxygen meter.

Water level measurements will be taken with a Solinst water level indicator (conductive probe).

2.7 Analytical Methods and Procedures

Currently identified contaminants of potential concern (COPCs) in soil at the Site include total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), and lead. COPCs in groundwater at the Site include benzene, toluene, ethylbenzene, and xylene (BTEX), PAHs, and bis(2-ethylhexyl)phthalate (DEHP), although the latter appears to be either from laboratory/equipment contamination, or from off-site based on concentration distribution. For characterization purposes, the investigation activities will also evaluate if additional COPCs may be present in the areas of concern at the site, particularly volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), metals, and tributyl tin (TBT)

All analytical methods will follow standard U.S. Environmental Protection Agency (EPA) procedures as outlined in *Test Methods for Evaluating Solid Wastes - Physical/Chemical Methods* (SW-846) as updated and DEQ-approved methods where necessary.

The analytical methods expected for use during Phase 1 and potentially during subsequent phases of this project are as follows:

<u>Parameter</u>	<u>Analytical Method</u>	
	<u>Soil</u>	<u>Water</u>
Diesel-Range TPH	NW TPH-Dx	NW TPH-Dx
Oil-Range TPH	NW TPH-Dx	NW TPH-Dx
BTEX	EPA 8021B or 8260B	EPA 8021B or 8260B
VOCs	EPA 8260B	EPA 8260B
DEHP	EPA 8270C	EPA 8270C
PAHs	EPA 8270 SIM	EPA 8270 SIM
PCBs	EPA 8082	EPA 8082
Priority Pollutant Metals *	EPA 6010/7000 Series	EPA 200.7, 245.1, and 7000 Series
TBT	Krone Method	Krone Method

* Antimony, beryllium, cadmium, chromium, copper, mercury, nickel, selenium, silver, thallium, zinc

2.8 Land Surveying

All soil borings and monitoring wells will be surveyed for relative location and elevation by a Port of Portland surveyor. For monitoring wells, both the ground surface and the top of the casing elevations will be surveyed. All survey data will be collected within an accuracy of 0.01 feet vertically and 0.1 feet horizontally. Relevant physical features will also be surveyed in order to compile an accurate map of the study area. However, legal property boundaries will not be surveyed.

3. SOIL SAMPLING PROCEDURES

3.1 Soil Sample Collection Procedures

Soil samples will be collected via the following methods which are described in more detail below: 1) split-spoon sampling device in drilled soil borings; 2) macrocore in push probe borings; 3) hollow bit in hand auger borings; or 4) with backhoe bucket in test pits. Soil Site Characterization samples will be collected at locations as indicated in the Site Characterization Plan.

Upon collection, all samples will be labeled and transferred to a chilled container for shipment to the analytical laboratory. Standard sampling protocols, including the use of chain-of-custody documentation, will be followed for all sampling procedures as discussed in Section 7.2.

Installation of all soil borings will be observed and logged by a geologist, engineer, or environmental scientist experienced in logging soils, under the direct supervision of an Oregon Registered Geologist (R. G.) or Professional Engineer (P.E.). As appropriate, drilling logs will include Standard Penetration Test blow counts, hammer weight, and drop length.

3.1.1 Drilled Soil Borings

Soil samples from drilled borings will be collected with a 2-inch OD split-barrel sampling device that will be driven into the undisturbed soils 1.5 feet ahead of the drill bit, using the Standard Penetration Test (SPT).

Soil samples collected from the split-spoon sampling device or will be manually transferred to a 9-ounce sample jar and capped with Teflon lined lid. In cases where brass sleeves are utilized (i.e., where volatile compounds are of interest), the sleeve containing the sample will be capped with Teflon paper, plastic end caps, and sealed with non-volatile silicon tape.

3.1.2 Push Probe Borings

In push probe borings, continuous soil cores will be collected using a 2-inch OD, 4-foot long, stainless-steel, Macro-Core sampler, fitted with a polyvinyl chloride (PVC) sleeve, that will be advanced 4 feet into the undisturbed soils.

Where limited access push probe borings are utilized (using hand-held equipment), soil samples will be collected using a 1.5-foot long, stainless steel split barrel sampler fitted with a PVC sleeve that will be advanced 1.5 feet into the undisturbed soils.

Soil samples will be collected from push probes by cutting open the PVC sleeve and placing soil in a 9 ounce sample jar that is capped with Teflon lined lid. In cases where volatile compounds will be analyzed, soil samples will be collected by cutting a 6-inch long section from the PVC sleeve that will immediately be capped with Teflon paper, plastic end caps, and sealed with non-volatile silicon tape.

3.1.3 Hand Auger Borings

In cases where access is an issue, soil samples may be collected from a hand auger equipped with a 2-inch OD hollow bit. Once the desired sampling depth is attained, the hand auger will be removed from the hole and soil collected from the auger tip.

In cases where volatile compounds will be analyzed, samples will be collected with a decontaminated slide-hammer sampler equipped with a 6-inch long brass sleeve. Once the desired sampling depth is reached by the hand auger equipment, it will be removed whereupon the slide-hammer device will be used to drive the brass sleeve 6-inches into the undisturbed soils. The brass sleeve will immediately be capped with Teflon paper, plastic end caps, and sealed with non-volatile silicon tape.

3.1.4 Test Pits

Test pit soil samples will be collected with the backhoe bucket. Upon bringing the bucket to the surface, a sample will be obtained by scraping away approximately 3 inches of soil from the surface and immediately collecting the sample into a 9-ounce glass sample jar with teflon-lined lid.

In cases where volatile compounds will be analyzed, samples will be collected by driving a 6-inch long brass sleeve into the soil by hand. Upon removal, the brass sleeve will immediately be capped with Teflon paper, plastic end caps, and sealed with non-volatile silicon tape.

3.2 Soil Sample Description

The properties of all soil samples will be observed in the field by an HAI geologist, engineer, or environmental scientist experienced in logging soils, under the supervision of an Oregon R.G. or P.E. The properties of the soil, including color, moisture, plasticity, grading of coarse-grained soils, and texture, will be noted in the field and incorporated into a field boring log for each subsurface boring. An estimate of the Unified Soil Classification System (USCS) soil type designation (ASTM D 2487-85) will also be shown on the boring logs. The USCS soil type designation will be a field estimate only and will not be confirmed by laboratory analyses. Visual or olfactory evidence of contaminant occurrence in the samples, if present, will also be noted on the boring logs as discussed in Section 3.3.

3.3 Soil Field Screening Procedures

All soil samples will be screened in the field for the presence of contaminants by visual (color); olfactory, sheen, and headspace vapor methods. The results of the field screening observations will be noted on the field boring log.

The presence of sheen will be assessed by placing clean tap water in a black pan and introducing approximately 5 grams of disaggregated soil to the water. The observation for the presence or lack of sheen is a relative indicator of contamination.

Organic vapor levels in the soil samples will be measured by the headspace vapor method utilizing a MicroTIP Model MP-1000 equipped with a PID and a 10.6 electron volt (eV) lamp. Immediately following the collection of the sample, approximately 4 ounces of soil will be placed in a one-quart plastic bag and sealed. The sample will then be set aside for an approximate 20-minute stabilization period where the sample is allowed to reach ambient temperature. The detector probe is then inserted through the seal into the bag to collect the headspace sample. The results of the headspace screening will be recorded on the boring log in parts per million (ppm). The results of the headspace method will be used for qualitative screening purposes only.

4. GROUNDWATER SAMPLING PROCEDURES

4.1 Screening-Level Groundwater Samples from Temporary Well Points

Screening-level groundwater samples from drilled borings will be collected from temporary well points that are installed in the borehole. When using hollow stem auger drilling methods, vertical profiling of the water column using temporary well points is not typically recommended since this drilling method cannot seal off the borehole from other water-bearing zones. As such, use of this method with hollow stem auger equipment would only be utilized for sampling the uppermost groundwater, as necessary.

Once the desired water sampling depth is reached, the well point, constructed of 2-inch OD PVC casing and a 5-foot long PVC screen, will be placed inside the augers. The augers are then pulled up approximately 5 feet as a temporary sand pack is placed in the annulus. The well point will then be purged of at least one borehole volume of water, or until the casing is entirely evacuated, whichever occurs first. Groundwater samples will then be collected as per the methodology described in Section 4.3.

4.2 Screening-Level Groundwater Samples from Push Probe Borings

Groundwater samples will be collected from push probe borings by attaching a 4-foot long stainless steel well point to the probe and setting it across or beneath the anticipated groundwater level. For vertical profiling, the well point is directly driven to the desired depth for sampling. Once the desired depth is reached, the outer protective sheath is pulled back to expose the screen. Immediately following well screen placement, a water level measurement will be made with an electric water level meter. Groundwater will be purged from the screen by inserting a disposable polyethylene tube equipped with a check valve down the interior of the probe and a vacuum pump will be used to remove at least 1 borehole volume of water. Groundwater samples will then be collected as per the methodology described in Section 4.3.

4.3 Groundwater Samples from Monitoring Wells

At least 72 hours following development of the monitoring wells, the groundwater in monitoring wells will be sampled. Prior to sampling, at least three well casing volumes of water will be purged from each well using a peristaltic purge pump equipped with new polyethylene tubing. If water levels fall below 20 feet during purging of any of the wells, then a decontaminated submersible pump may be necessary for purging and sampling activities. The pH, temperature, and conductivity of the purged water will be measured to assess for stabilization of these parameters. Stabilization is considered to have been met when the last three measured values for each of the above parameters are within 10 percent of each other.

A representative sample of the groundwater will then be obtained using the peristaltic or submersible pump at a low flow rate. For volatile analyses, the groundwater sample will be collected using a new polyethylene bailer. The water will be carefully transferred to appropriate containers. The sampling containers will be completely filled such that no headspace is present that would allow the loss of volatiles. The sample bottles will then be transferred to a chilled container for shipment to the analytical laboratory.

4.4 Water Level Monitoring

Prior to a monitoring well sampling event, and at any other designated water level monitoring events, the static water levels in monitoring wells will be measured to the nearest 1/100th of a foot with a Solinst water level indicator (conductive probe). The water levels will be measured from the north side of the top of the casing where a notch will be cut. The water level from the staff gauge in the Willamette River will also be measured during each water level monitoring event.

5. DECONTAMINATION PROCEDURES

All drilling and push probe equipment will be steam-cleaned between drilling locations to prevent cross-contamination. All soil sampling equipment will be decontaminated prior to each sample by using a detergent (Alconox) solution wash, followed by two separate potable water rinses. In the case of equipment that has been used to sample obviously impacted soil with visible product, a hexane wash will be added between the first and second potable water rinse.

The peristaltic pump will not need decontamination since water never comes in contact with any re-usable part. However, the submersible pump or water level indicator will be decontaminated following the procedure as detailed for soil sampling equipment.

6. INVESTIGATIVE DERIVED WASTE (IDW)

Investigative derived waste (IDW) will be managed in a manner that is consistent with the U.S. Environmental Protection Agency (EPA) *Guide to Management of Investigation Derived-Wastes* dated January 1992.

All soil cuttings, purge water, decontamination water, and development water generated during the investigation activities, will be containerized and left on-site pending a determination as to appropriate disposition. Disposal of all IDW will either take place as soon as practicable following characterization of the waste or be incorporated into the scope of removal actions conducted at the Site.

All disposable personal protective equipment (gloves, etc.) and disposable sampling equipment (sleeves, bailers, tubing, etc.) generated during any sampling event will be disposed of at a permitted municipal solid waste disposal facility.

7. QUALITY ASSURANCE (QA)/QUALITY CONTROL (QC)

7.1 Quality Control Samples

Three types of QC field samples may be used for the investigation activities including field duplicates, trip blanks, and field equipment blanks. Analytical parameters for QC samples may change with each area investigated at the site and are specified in the Site Characterization Plan.

One duplicate soil sample will be collected and analyzed for every 20 investigative samples analyzed. One duplicate groundwater sample will be collected and analyzed for

every 10 groundwater samples analyzed. One duplicate groundwater sample will be collected and analyzed for each monitoring well sampling event.

One trip blank sample will be analyzed for every two days of groundwater sampling and one per monitoring well sampling event. The trip blanks will be prepared by the analytical laboratory, and placed in the sample cooler prior to arrival on-site.

A field equipment blank will be collected for every two days of screening-level groundwater sampling and one per monitoring well sampling event. Following decontamination of the pump, de-ionized water will be passed through the unit, and the effluent water will be collected in appropriate sampling containers.

Laboratory QC for this project will involve standard EPA QC guidelines as described in *Test Methods for Evaluating Solid Wastes - Physical/Chemical Methods* (SW-846) and therefore will not be repeated here. Laboratory QC will include calibration standards, laboratory control samples, reagent blanks, matrix spikes, matrix spike duplicates, surrogate spikes, and laboratory duplicates.

7.2 Sample Handling Procedures

7.2.1 Sample Containers

The sample container, preservation, and holding time requirements for each sample matrix and the anticipated analytical methods are summarized on Table A1. All samples will be transferred to the appropriate sampling containers and placed into a chilled (4°C) transport container for shipment to the laboratory. The chilled transport containers (coolers) will be utilized for temporary storage of the samples.

7.2.2 Sample Labels

A sample label will be attached to each sampling container prior to the sampling event. Information to be included on the label will include the following:

- 1) Sample number
- 2) Date and time of sample collection
- 3) Initials of person collecting the sample
- 4) HAI project number
- 5) Type of preservative, if any

Individual samples will be identified using a unique sample number that includes a sample prefix consisting of the HAI project number and a six digit date code. The prefix will be followed by an individual sample collection number that will be assigned sequentially as the samples are collected (e.g. 5106-000411-001).

7.2.3 Chain-of-Custody Record and Shipment

Chain-of-custody (COC) procedures will be followed from the time of sample collection to the conclusion of laboratory analysis.

Field COC procedures include:

- Label containers with sample location and sample information plus the analytical parameter(s) that the container contents are intended for. Date, time and sampler information will be written on the label in the field.
- Complete chain-of-custody forms for all samples en route to laboratory. An example of the Chain-of-Custody form is attached at the end of this appendix. Upon transferring samples to the laboratory sample custodian, designated staff will sign, date and note the time of transfer on the chain-of-custody form.
- Ship samples in ice chests sealed with custody seals, unless relinquished directly to a laboratory representative. The integrity of the seals is established at the laboratory by the laboratory sample custodian.
- Ensure that the samples are in possession or view of field staff or in secure storage at all times.
- Transport samples to the laboratory as soon as possible, observing appropriate preservation and holding-time requirements.
- Transfer custody of the samples to the appropriate COC lockers and refrigerators. Document the transfer on the appropriate COC record-keeping form and/or logbook.
- Notify the appropriate people that the samples had arrived.

Upon receipt of the samples at the laboratory, the laboratory sample custodian will inventory the samples by comparing sample labels to those on the COC document. The custodian will enter the sample number into a laboratory tracking system by project code and sample designation. The custodian will assign a unique laboratory number to each sample and will be responsible for distributing the samples to the appropriate analyst or for storing samples in an appropriate secure area.

7.3 Documentation Procedures

Documentation of field procedures, observations, and measurements will be provided through the use of field logs, chain-of-custody, and photographs.

All data collection activities will be documented using waterproof field forms and indelible ink. All field entries will be signed, dated, and as detailed and descriptive as possible. If an incorrect entry is made on any form, it will be lined out, the correct information entered, and the correction will be initialed and dated by the person making the correction.

Overall documentation of the nature and timing of field activities will be provided daily with an HAI Project Field Notes form. All borings and wells will be documented with a field Boring Log form. Development, purging, and sampling of any wells or temporary well points will be documented with a Groundwater Sampling Summary form. Investigative wastes will be documented using an IDW Inventory form. Examples of these forms are included as Attachment A.

7.4 Equipment Calibration and Maintenance Procedures

All field equipment will be calibrated prior to use according to the manufacturer's instructions. The results of calibrations and any records of repair will be maintained on the HAI Project Field Notes form. Equipment that fails calibration or fails to operate properly will be removed from service and segregated from the operational equipment. Such equipment will be repaired and re-calibrated if possible, or replaced. Preventive maintenance of field equipment is performed according to the procedures indicated in the manufacturer's manuals.

Laboratory analytical equipment and instruments will be calibrated in accordance with the laboratory's internal quality assurance/quality control (QA/QC) program.

7.5 Data Reduction and Validation

All field data will be summarized and recorded on appropriate field forms. Descriptive data including soil types, field screening results, observations, and water levels will be summarized in a final appropriate format on boring logs or tables.

Laboratory data will be recorded by a computer system that collects and compiles raw data. The analytical laboratory will conduct necessary QC calculations that will be summarized in final laboratory reports. All final laboratory reports will be included as an appendix or appendices to the site characterization report. In addition, all analytical data will be summarized in tabular form.

Analytical data will be assessed to ensure that they are of acceptable quality. This assessment will include a review of the following:

- Sampling dates
- Requested analysis
- Chain-of-Custody documentation
- Sample preservation
- Holding times
- Method blanks
- Surrogate recoveries
- Matrix spike results
- Matrix spike/matrix spike duplicate analyses
- Laboratory duplicates
- Field duplicates
- Laboratory control samples
- Method reporting limits above requested levels
- Any additional comments or difficulties reported by the laboratory
- Overall laboratory assessment of data quality

GLOSSARY OF ABBREVIATIONS

ASTM	American Society of Testing and Materials
bgs	below existing ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
C	degrees centigrade
DEHP	bis(2-ethylhexyl)phthalate
DEQ	Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
eV	electron volt
ID	inside diameter
IDW	investigative-derived waste
NAPL	non-aqueous phase liquid
OAR	Oregon Administrative Rule
OD	outside diameter
ORS	Oregon Revised Statutes
OWRD	Oregon Water Resources Division
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
QA	quality assurance/
QC	quality control
SCP	Site Characterization Plan
SAP	Sampling and Analysis Plan
SPT	standard penetration test
TPH	total petroleum hydrocarbons
USCS	Unified Soil Classification System
VOCs	volatile organic compounds

TABLE A1
Sample Container, Preservation, and Holding Time Requirements

Work Plan for Supplemental Site Characterization
 Marine Terminal 1 South
 2100 NW Front Avenue
 Portland, Oregon

Project No. 5106

Method Number	Technique	Sample Matrix	Sample Container	Preservation	Holding Time
NW TPH-Dx Diesel-range and Oil-range Quantification	GC/FID	Soil	8-ounce glass jar	Cool to 4 C	extract within 14 days
		Water	1-liter glass amber bottle	Cool to 4 C	extract within 7 days
EPA Method 8021B Benzene, Toluene, Ethylbenzene, Xylene (BTEX)	GC/PID	Soil	6-inch PVC or brass sleeve capped with teflon tape and plastic end caps	Cool to 4 C	14 days
		Water	(3) 40-ml VOA vials	Cool to 4 C HCl pH<2	14 days
EPA Method 8260B Volatile Organic Compounds (VOCs)	GC/MS	Soil	6-inch PVC or brass sleeve plastic end caps	Cool to 4 C	14 days
		Water	(3) 40-ml VOA vials	Cool to 4 C HCl pH<2	14 days
EPA Method 8270C bis(2-ethylhexyl)phthalate (DEHP) EPA 8270 SIM Polynuclear Aromatic Hydrocarbons (PAHs)	GC/MS	Soil	8-ounce glass jar	Cool to 4 C	14 days
		Water	1-liter glass amber bottle	Cool to 4 C	extract within 7 days
EPA Method 8082 Polychlorinated Biphenyls (PCBs)	GC/ECD	Soil	8-ounce glass jar	Cool to 4 C	extract within 14 days
		Water	1-liter amber glass	Cool to 4 C	extract within 7 days
Total Metals: Antimony, beryllium, cadmium, chromium, copper, mercury, nickel, selenium, silver, thallium, zinc EPA Method 6010/200.7	ICP	Soil	8-ounce glass jar	Cool to 4 C	6 months
		Water	1-liter plastic	Cool to 4 C HNO3	6 months
EPA Method 7060 - Arsenic	Cold Vapor Analyzer	Soil	8-ounce glass jar	Cool to 4 C	23 days
EPA Method 7421 - Lead					
EPA Method 7470A Mercury	Cold Vapor Analyzer	Water	1-liter plastic	Cool to 4 C HNO3	23 days
EPA Method 245.1 Mercury					
Krone Method Tributyl Tin	GC/FPD	Soil	8-ounce glass jar	Cool to 4 C	7 days
		Water	1-liter amber glass	Cool to 4 C	7 days

NOTE: C = degrees centigrade
 EPA = U.S. Environmental Protection Agency
 FID = flame ionization detector
 GC = gas chromatography
 GC/FPD = gas chromatography flame photometric detection
 HCl = hydrochloric acid

HNO3 = nitric acid
 ICP = inductively coupled plasma
 PVC = polyvinyl chloride
 TPH = total petroleum hydrocarbons
 VOA = volatile organic analyses

ATTACHMENT A
Example Field Logs and Forms

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717		BORING NUMBER: _____									
PROJECT: Marine Terminal 1 2100 NW Front Avenue Portland, Oregon PROJECT #: 5106		HAI LOGGER:								DRILL START	DRILL FINISH
		SAMPLING METHOD:								Time:	Time:
		DRILLING METHOD:								Date:	Date:
		EQUIPMENT TYPE:								Date:	Date:
		DRILLER:								Date:	Date:
		DRILLING CONTRACTOR:									

ABANDONMENT DETAILS	SAMPLE NUMBER	TIME	HEADSPACE (ppm)	LAB RESULTS TPH (ppm)	SPT (blows/0.5 feet)	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	BORING DIAMETER: CASING DIAMETER: SURFACE ELEVATION: TOP OF CASING ELEVATION:	SOIL DESCRIPTION
							1				
							2				
							3				
							4				
							5				
							6				
							7				
							8				
							9				
							10				
							11				
							12				
							13				
							14				
							15				
							16				
							17				
							18				
							19				
							20				

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717		BORING NUMBER: _____									
PROJECT: Marine Terminal 1 2100 NW Front Avenue Portland, Oregon PROJECT #: 5106		HAI LOGGER:								DRILL START	DRILL FINISH
		SAMPLING METHOD:								Time:	Time:
		DRILLING METHOD:									
		EQUIPMENT TYPE									
		DRILLER:								Date:	Date:
DRILLING CONTRACTOR:											
ABANDONMENT DETAILS	SAMPLE NUMBER	TIME	HEADSPACE (ppm)	LAB RESULTS TPH (ppm)	SPT (blows/0.5 feet)	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	BORING DIAMETER: CASING DIAMETER: SURFACE ELEVATION: TOP OF CASING ELEVATION:	
										SOIL DESCRIPTION	
							21				
							22				
							23				
							24				
							25				
							26				
							27				
							28				
							29				
							30				
							31				
							32				
							33				
							34				
							35				
							36				
							37				
							38				
							39				
							40				

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717		MONITORING POINT NUMBER MP - 11	
PROJECT: Marine Terminal 1 2100 NW Front Avenue Portland, Oregon		OWRD # HAI LOGGER: Joan Doe	
PROJECT: 5106		SAMPLING METHOD: 2 & 3-inch Split Spoon Sampler	
DRILLING METHOD: Hollow Stem Auger		DRILL START Time: 14:05	
EQUIPMENT TYPE: Mobile B-59		DRILL FINISH Time: 8:23	
DRILLER: John Doe		Date: 1-Apr-98	
DRILLING CONTRACTOR: Good Drilling Company		Date: 2-Apr-98	

WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	LAB RESULTS TPH-G (ppm)	SPT (blows/0.5 feet)	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	SOIL DESCRIPTION
Flush Monument										Ground surface
#8 Bentonite 3/4-inch ID PVC casing 10/20 Colorado Silica Sand 3/4-inch ID PVC 0.010-inch slotted screen					100		1		GM	Silty GRAVEL - brown, moist, dense, non-plastic, no petroleum odor, no sheen by sheen test, fill.
					100		2			
				1.4	100		3		ML	Sandy SILT - brown, moist, firm, non-plastic, no petroleum odor, no sheen by sheen test.
	081	1408			100		4			
					0		5			
					0		6			Sandy SILT - as above, no petroleum odor, no sheen by sheen test.
	082	1411		0.4	100		7			
					100		8			
	083	1413			100		9		SM	Silty SAND - brown, moist, medium dense, non-plastic, no petroleum odor, no sheen by sheen test.
					100		10			
	084	1415		210	100		11			Silty SAND - as above, petroleum odor, sheen by sheen test.
				24.6	100		12			
	085	1422		170	100		13			Silty SAND - as above, petroleum odor, no sheen by sheen test.
				103	100		14			
						15			Monitoring well installed to 14.0 feet bgs	
						16			* Sample Prefix Number is 32820-040198-	
						17				
						18				
						19				
						20				

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717				MONITORING WELL NUMBER OWRD #				MW - 1s	
PROJECT: Marine Terminal 1 2100 NW Front Avenue Portland, Oregon				HAI LOGGER: Joan Doe				DRILL START	DRILL FINISH
PROJECT: 5106				SAMPLING METHOD: 2 & 3-inch Split Spoon Sampler				Time:	Time:
				DRILLING METHOD: Hollow Stem Auger				11:00	15:00
				EQUIPMENT TYPE: Mobile B-59				Date:	Date:
				DRILLER: John Doe				14-Feb-99	14-Feb-99
				DRILLING CONTRACTOR: Good Drilling Company					
WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	FLUORESCENCE	SPT (blows/0.5 feet)	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)
BORING DIAMETER: 10 1/4-inch OD									
CASING DIAMETER: 2-inch ID									
SURFACE ELEVATION: 346.25 feet MSL									
TOP OF CASING ELEVATION: 345.92 feet MSL									
SOIL DESCRIPTION									
Flush Monument									Ground surface
Concrete 3/4-inch Bentonite chips 2-inch ID Blank PVC Casing Colorado 10/20 Sand Pack 2-inch ID 10 slot PVC Screen							1		GP
							2		
							3		ML
							4		
							5		GW
	036	1115			5	100	6	2/21/97	
			45	No	20	100	7		
					6	100	8		
	037	1130			27	100	9	2/14/97	
			22	No	50	20	10		
					4	100	11		
	038	1140			5	100	12		GW
			41	No	28	10	13		
	039	1150			30	100	14		
			25	No	50	20	15		
					15	100	16		
	040	1200			18	100	17		
			32	No	12	20	18		
	-	1210	-	-	>50	-	19		GW
							20		

Asphalt
GRAVEL - brown, moist, dense, non-plastic, poorly graded, (fill).

SILT - brown, moist, firm, slightly-plastic, no odor, no discoloration.

Sandy GRAVEL with some silt - brown, moist, very dense, non-plastic, moderately graded, no odor, no discoloration, no sheen.

Sandy GRAVEL with some silt - as above, wet, no odor, no discoloration, no sheen.

Sandy GRAVEL with some silt - as above, no odor, no discoloration., no sheen.

Sandy GRAVEL with some silt - as above, no odor, no discoloration, no sheen.

Sandy GRAVEL with cobbles and trace silt - brown, wet, very dense, non-plastic, moderately graded, no odor, no discoloration, no sheen.

HAHN & ASSOCIATES, INC. 434 NW Sixth Avenue Portland, Oregon (503) 796-0717				MONITORING WELL NUMBER				MW - 1s			
				OWRD #							
PROJECT: Marine Terminal 1 2100 NW Front Avenue Portland, Oregon				HAI LOGGER: Joan Doe				DRILL START		DRILL FINISH	
				SAMPLING METHOD: 2 & 3-inch Split Spoon Sampler				Time: 11:00		Time: 15:00	
				DRILLING METHOD: Hollow Stem Auger				Date: 14-Feb-99		Date: 14-Feb-99	
				EQUIPMENT TYPE: Mobile B-59							
PROJECT: 5106				DRILLER: John Doe							
				DRILLING CONTRACTOR: Good Drilling Company							
WELL CONSTRUCTION DETAILS	SAMPLE NUMBER*	TIME	HEADSPACE (ppm)	FLUORESCENCE	SPT (blows/0.5 feet)	RECOVERY (%)	DEPTH (feet)	GROUNDWATER	STRATA (USCS)	BORING DIAMETER: 10 1/4-inch OD	
										CASING DIAMETER: 2-inch ID	
										SURFACE ELEVATION: 346.25 feet MSL	
										TOP OF CASING ELEVATION: 345.92 feet MSL	
										SOIL DESCRIPTION	
Colorado 10/20 Sand Pack 2-inch ID 10 slot PVC Screen	041	1215			45	100			GW	Sandy GRAVEL with cobbles and trace silt - as above, no odor, no discoloration, no sheen.	
			19	No	>50	20		21			
								22			
								23			
	042	1230			28	100		24		Sandy GRAVEL with cobbles and trace silt - as above, no odor, no discoloration, no sheen.	
			16	No	30	20		25			
	Cap							26			
								27			
								29			
								30			
							31				
							32				
							33				
							34				
							35				
							36				
							37				
							38				
							39				
							40				

EXAMPLE

Materials:
 1 flush monument
 1 lock
 1 10-foot PVC casing
 1 5-foot PVC casing
 1 10-foot 0.010-slot PVC screen
 12 50# bags 10/20 colorado silica sand
 9 50# bags bentonite chips
 2 50# bags cement

 * Sample Number Prefix: 3484-990214-

HAHN AND ASSOCIATES, INC.

PROJECT FIELD NOTES

Page 1 of _____

Date :

Project:

Project Manager:

WORK FORCE

EQUIPMENT

SITE

HAI	Rental/Vendor	Conditions
Subcontractor	Rental/Vendor	Temperature
Subcontractor		

HAI EQUIPMENT

Cond/pH/Temp Meter	MicroTip/PID	Pump, Peristaltic	UV Box	
Water Level Meter	Gas Meter (GasTech)	Pump, Purge	Wtr Filter Unit	
Interface Probe	Magnetometer	Pump, Submersible	Aquifer Test	
DO Meter	Hand Auger	Generator	Bailer (SS or Teflon)	
Turbidity Meter	Measuring Wheel	Pressure Transducer	Data Logger (Hermit)	
Air Pump (Sensidyne)	Power Tool	Troll 4000		

HAI SUPPLIES

Gloves, Nitrile (pr.)	Tubing (well)	Labels	Concrete (bags)
Gloves, Solvex (pr.)	Bailer (disposable)	Caution Tape	Stakes
Gloves, Edmont (pr.)	Water Filters	Teflon Tape	Resp. Cartridges (pr.)
Tyvek, coated	Locking Caps	Deionized Water (gal)	Sample Tubes
Booties (pr.)	Locks	Distilled Water (gal)	Sensidyne Tubes

ACTIVITIES

Leave Office:	Arrive Site:	Leave Site:	Arrive Office:	
Respirator Use/ Hours:___ Minutes:___		Odometer Out:	Odometer In:	Total Mileage:

[illegible]

(5/99)

Signed

POPT1S605010

HAHN AND ASSOCIATES, INC.
PROJECT FIELD NOTES

Page ____ of ____

Date :

Project: _____

Project Manager: _____

CONTINUATION SHEET[illegible]

(5/92)

Signed _____

POPT1S605011

INVESTIGATIVE DERIVED WASTE (IDW) INVENTORY FORM

Page ____ of ____

Project Name Marine Terminal 1
 Project Location 2100 NW Front Avenue
 Portland, Oregon

Project Number 5106
 Project Manager
 Date

<-- Fill Out In Field Follow-Up -->

Container #	Container Type	Contents	Date of Generation	Labeled As	Waste Determination	Date of Disposal	Disposal Method	Disposal Location	Comments
CHOICES	55-gal drum 32-gal drum Other (explain)	Soil Cuttings Purge Water Decon Water PPE Sampling Supplies Other (explain)		Hazardous Special Non-hazardous Other (explain)	Hazardous Special Non-hazardous Other (explain)		Landfill Treatment On-site Disposal	Hillsboro TPS Arlington Other (indicate)	

Updated By: _____ Date: _____
 Updated By: _____ Date: _____

Updated By: _____ Date: _____
 Updated By: _____ Date: _____

Well Development Summary Sheet

WELL NUMBER _____

General Information	
Project Name	Marine Terminal 1
HAI Project Number	5106
Date	
Developing Personnel	
Purge Method	

Purge Volume Calculation					
Total Well Depth (ft)	Static Water Level (ft)	Water Column (ft)	Convert Factor (gal/foot)	One Well Vol (gal)	TEN Well Vol (gal)

2' well = 0.17 gallons/linear ft

4" well = 0.66 gallons/linear ft

[illegible]

Purge Water Disposition			
Drum No.	Storage Tank No.	On Ground	Other

WELL NUMBER

Sample Information
Sample Date
Sample Time
Sample Number

2' well = 0.17 gallons/linear ft 4" well = 0.66 gallons/linear ft

Sample Containers			
Number	Type	Preservative	Analytical Parameters

[illegible]

Purge Water Disposition			
Drum No.	Storage Tank No.	On Ground	Other

WELL POINT NUMBER

Sample Information
Sample Date
Sample Time
Sample Number

2' well = 0.17 gallons/linear ft 4" well = 0.66 gallons/linear ft

Sample Containers			
Number	Type	Preservative	Analytical Parameters

[illegible]

SITE HEALTH AND SAFETY PLAN

**Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon**

August 31, 2000

Prepared for:

**The Port of Portland
Portland, Oregon**

Prepared by:

**Hahn and Associates, Inc.
Portland, Oregon**

HAI Project No. 5106

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 SITE DESCRIPTION	1
2.1 Site Location	1
2.2 Site Features	1
2.3 Contaminants of Concern	2
3.0 ORGANIZATION AND COORDINATION	2
4.1 Site Personnel/Team Organization	2
4.0 SITE CONTROL	3
5.0 HAZARD EVALUATION	3
5.1 Physical Hazards	3
5.2 Chemical Hazards	4
5.3 Hazard Zone Delineation	4
6.0 PERSONAL PROTECTIVE EQUIPMENT	4
6.1 Basic Equipment And Levels of Protection	4
6.2 Applicability of Basic Equipment and Safety Equipment	5
7.0 COMMUNICATION PROCEDURES	6
8.0 DECONTAMINATION PROCEDURES	6
9.0 SITE SAFETY AND HEALTH	7
9.1 Designated Site Health and Safety Officers	7
9.2 Emergency Medical Care	8
9.3 Environmental Monitoring	8
9.4 Work Limitations	8
9.5 Emergency Procedure	9
10.0 PLAN APPROVAL	10
11.0 SIGNATURES	10
12.0 GLOSSARY OF ABBREVIATIONS	12

ATTACHMENTS

- A Material Safety Data Sheets
- B Hospital Location Map

SITE HEALTH AND SAFETY PLAN

Marine Terminal 1 South
2100 NW Front Avenue
Portland, Oregon

August 31, 2000

1.0 INTRODUCTION

This site-specific Site Health and Safety Plan (HASP) has been developed as required by the Occupational Safety and Health Administration (OSHA) according to the Code of Federal Regulations (CFR) 29 CFR 1910.120. The Site Health and Safety Plan includes discussion under the following section headings: Site Description; Organization and Coordination; Site Control; Hazard Evaluation; Personal Protective Equipment; Communication Procedures; Decontamination Procedures; and Site Safety and Health.

This Site Health and Safety Plan applies to members of the Hahn and Associates, Inc. (HAI) field staff and HAI subcontractors. The Plan is not intended for use by other consultants or contractors working at the site. In addition, this HASP applies only to upland areas of the Marine Terminal 1 South site (the "Site").

Based on the results of previous investigatory activities performed at the site, as well as available information regarding site operations, Level D protection is recommended for all work activities. However, the level of protection may be upgraded to Level C if applicable conditions within Section 6.0 of this plan are identified.

2.0 SITE DESCRIPTION

2.1 Site Location

Marine Terminal 1 is located at 2100 NW Front Avenue, Portland, Oregon. The study area relates only to the portion of Marine Terminal 1 that is located northwest of Interstate 405, northeast of NW Front Avenue, southeast of Slip No. 2, and southwest of the Willamette River.

2.2 Site Features

Two primary structures designated as Warehouse No. 2 and House No. 104, respectively, are located at the site. Currently, portions of the study area are leased by three tenants that include High-Temp Northwest, Inc. (Warehouse No. 2), Thermo Pressed Laminates, Inc. (House No. 104), and Tristar Transload (area southeast of Slip No. 2 and north of House No. 104). The remaining portions of the site are unoccupied. The topography at the Site is generally level at an elevation of approximately 30 feet above mean sea level (msl). The property is generally asphalt or concrete covered with little or no vegetation, with the exception of the rail-spur area that borders the southern margin of the property.

2.3 Contaminants of Concern

Based on a Focused Environmental Site Assessment¹ (ESA) conducted by Maul Foster and Alongi (Maul Foster) and Environmental Baseline Investigations² conducted by HAI, the currently identified contaminants of potential concern (COPCs) in soil at the Site include total petroleum hydrocarbons (TPH), polynuclear aromatic hydrocarbons (PAHs), and lead. COPCs in groundwater at the Site include BTEX, PAHs, and bis(2-ethylhexyl)phthalate (DEHP), although the latter appears to be either from laboratory/equipment contamination, or from off-site based on concentration distribution. For characterization purposes, the investigation activities will also evaluate if additional COPCs may be present in the areas of concern, particularly volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and metals.

3.0 ORGANIZATION AND COORDINATION

4.1 Site Personnel/Team Organization

<u>Team Member</u>	<u>Responsibility</u>	<u>Work Zone(s)</u>
Guy Tanz	HAI Project Supervisor, Health and Safety Officer	All
Jay Greifer	HAI Field Team Leader, Site Safety Coordinator	All
Field Team	Conduct field activities	All

4.2 Work Team Job Functions

Health and Safety Officer	Administer HAI's HASP and ensure HASP, accident reports
Site Safety Coordinator	Carry out all aspects of HASP, ensure all HAI employees and subcontractors adhere to HASP
Field Team Leader	Supervise, obtain samples, air monitoring, logging
Field Team Member(s)	Drilling, surveying, excavating

All personnel arriving or departing the site should log in and out with the Site Safety Coordinator. All activities on site must be cleared through the Project Team Leader.

¹ Maul Foster and Alongi, Inc. (1998) *Focused Environmental Site Assessment, Terminal 1, Between Slip No. 2 and the Freemont Bridge, Northwest Portland, Oregon, August 25, 1998*

² Hahn and Associates, Inc. (2000) *Report on Environmental Baseline Investigation for Marine Terminal 1 Redevelopment, Port of Portland Marine Terminal 1, 2100 NW Front Avenue, Portland, Oregon, May 15, 2000*

4.0 SITE CONTROL

- 1) Conduct a daily site safety meeting to discuss each day's planned activities and review the HASP, particularly communications. Additional topics should include:
 - Location of nearest telephone and post the emergency telephone numbers.
 - Location of nearest hospital and post the location.
 - Designation and location of emergency vehicle and location of operating keys.
 - Days weather report and weather conditions, in particular wind direction.
 - A discussion of any unexpected conditions/hazards (windy conditions etc.).
 - Determine location of support zone and decontamination.
 - A discussion of work zones and any necessary modifications to levels of protection required.
 - Review emergency site egress point(s).
- 2) Maintain access to the site and exclusion zones during the project duration. Exclusion zones should be developed and maintained during the work activities.
- 3) Team members don specified level of protection prior to entering any temporary exclusion zone. The entire decontamination process will be conducted prior to exiting.

5.0 HAZARD EVALUATION

There are two general forms of hazards expected at the site that include: 1) physical hazards; and 2) chemical hazards.

5.1 Physical Hazards

Physical hazards generally include heavy equipment, vehicles, utilities (overhead and underground), and other hazards such as slip, trip, and fall. It is expected that all of these hazards will likely be present at the site. Personnel at the site should be remain aware of such hazards.

5.2 Chemical Hazards

Site specific hazardous substances have been identified to be present in the soils and groundwater at the site. Based on previous investigation activities (Maul Foster 1998 and HAI 2000) the contaminants of potential concern for the site include:

Soil

- TPH
- PAHs
- Lead

Groundwater

- BTEX
- PAHs
- DEHP

Personnel may be exposed to these constituents during on-site activities.

In general, primary exposure routes of the identified hazards include dermal contact, incidental oral ingestion of contaminant-laden soils and/or dust and inhalation of vapors or dust. Material safety data sheets (MSDS) for primary contaminants of concern for the site are included in Attachment A. For a summary of symptoms via exposure routes for primary constituents refer to the MSDS sheets.

5.3 Hazard Zone Delineation

Physical hazards are of concern across the entire site and chemical hazards are of concern at the specific areas to be investigated. As such, the entire site is considered to warrant Level D personal protective equipment (PPE) while upgrade to Level C may be warranted under certain conditions at areas of investigation as described in Section 6.0.

6.0 PERSONAL PROTECTIVE EQUIPMENT

6.1 Basic Equipment and Levels of Protection

Level D: Work coveralls or tyvek suits, steel toe/shank boots, safety glasses, and hard hat

Level C: Level D plus dust resistant Tyvek coveralls, disposable nitrile or vinyl gloves, half-face respirator with appropriate cartridge

HAI does not conduct work in Level A or Level B environments.

Level D PPE can be used when the atmosphere contains no known hazard; oxygen concentrations are not less than 19.5%; and work functions preclude splashes, immersion, or the potential for unexpected inhalation of a contact with hazardous levels of chemicals.

Level C PPE can be used when oxygen concentrations are not less than 19.5 %; atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any exposed skin; types of air contaminants have been identified, concentrations measured, and a cartridge or canister is available that can remove the contaminant; atmospheric contaminant concentrations do not exceed immediately dangerous to life and health (IDLH) levels; and job functions do not require self-contained breathing apparatus.

Modification of the Level C PPE equipment will be the decision of the Site Safety Coordinator.

6.2 Applicability of Basic PPE and Safety Equipment

<u>Zone</u>	<u>Level of Protection/PPE</u>	<u>Safety Equipment</u>
All areas	Level D	Emergency vehicle first aid kit, blanket, fire extinguisher, mobile telephone, drinking water
Exclusion Zone, Contamination- Reduction Zone, Decontamination Line	Level D	As above, decontamination water, eyewash, tape, extra gloves

Upgrade to Level C PPE will take place when either of the following conditions occur:

- Visible air-borne dust is present in work areas of known or suspected TPH, PAH, or lead contamination.

7.0 COMMUNICATION PROCEDURES

1) Daily Procedures

- Prior to beginning daily field activities, a tailgate meeting will be held in the Support/Clean zone to review project status, work objectives, zone delineation, present site conditions, levels of protection, individual team member responsibilities, access and egress points, and decontamination procedures.

2) Field Communication Procedures

- Field activities will be directed using oral communications with appropriate hand signals to be used.
- A minimum of one cellular phone will be on-site during all field activities and will be designated as the field phone for use by team members.

8.0 DECONTAMINATION PROCEDURES

1) Decontamination Procedures (for personnel, equipment, meters, samples, etc.):

- Personnel: If disposable booties are worn, these should be discarded; neoprene boots should be washed with potable water and trisodium phosphate (TSP) or Alconox solution, followed by two separate potable water rinses. Remove tyveks and discard. Remove gloves and discard.
- Equipment: All drilling equipment will be steam-cleaned between drilling locations to prevent cross-contamination between borings. All soil sampling equipment will be decontaminated after each sample by using a detergent solution wash, followed by two potable water rinses.
- Emergency decontamination will include all of the specified steps to the extent practicable.

2) Material Disposal Methods

- Contaminated Articles: Disposable personnel protective equipment and sampling equipment will be placed in plastic bags and disposed as solid waste. Bags of soiled equipment will not be accessible to the public prior to disposal (to eliminate scavenging of these articles).
- All soil cuttings from push probe and/or soil borings will be placed in 55-gallon drums and characterized to determine appropriate disposal.
- If field indicators do not indicate the presence of a sheen on decontamination and/or purge water, then it will be placed on bare ground for percolation. If sheen is observed then it will be placed in 55-gallon drums and left on site for disposal at a later date.

Note: It is the responsibility of the Site Safety Coordinator to make sure that all pieces of equipment coming off site are properly decontaminated according to the procedures outlined above.

9.0 SITE SAFETY AND HEALTH

9.1 Designated Site Health and Safety Officers

HAI Site Safety Officer
Guy Tanz, Associate
(503) 796-0717
gtanz@hahnasoc.com

HAI Corporate Management
Mr. Roger Brown, Principal
(503) 796-0717
rbrown@hahnasoc.com

HAI Health and Safety Officer
Rob Ede, Sr. Project Mgr.
(503) 796-0717
rede@hahnasoc.com

HAI Site Safety Coordinator
Mr. Jason Greifer, Scientist
(503) 804-0741 (mobile phone)
jgreifer@hahnasoc.com

HAI Mailing Address
434 NW 6th Avenue, Su. 203
Portland, Oregon 97209

9.2 Emergency Medical Care

<u>Entity</u>	<u>Phone or Address</u>
Police	911
Fire	911
Paramedic	911
Hospital	Legacy Good Samaritan Hospital 1015 Northwest 22 nd . Avenue Portland, OR 97210 (503) 229-7711 Contact: Emergency
Poison Control Center	Oregon Poison Center (503) 494-8968 Contact: Emergency

9.3 Environmental Monitoring

It is not anticipated that environmental monitoring will be necessary for the work activities at the site. Based on the contaminant routes of exposure, it is expected that the selected Level D PPE will be protective of site workers. However, if blowing dust appears to be present, then personnel will be required to upgrade to Level C PPE.

9.4 Work Limitations

- 1) When in Level C, schedule beverage/rest breaks of a minimum of 15 minutes in a shaded area every 2 hours when ambient temperature exceeds 75° F. When ambient temperatures exceed 80° F, provide a beverage/rest breaks of a minimum of 15 minutes in a shaded area every 1 1/2 hours.
- 2) Work will be performed only during daylight hours unless adequate lighting is provided.
- 3) No eating, drinking, or smoking within contamination zones.
- 4) No facial hair is acceptable that would interfere with respirator fit.
- 5) No contact lenses on site.
- 6) Buddy system at all times in contamination zone (visual/voice contact).

9.5 Emergency Procedures

1) Basic Procedures

Stabilize injured person and remove from contamination zone, following the decontamination procedures as much as practicable

Notify the Site Safety Coordinator

The Site Safety Coordinator will direct activities during a medical emergency.

Initiate first aid and immediately get medical attention for the injured party.

Depending upon the type and severity of the injury, call the appropriate emergency response agency.

Notify the health and safety officer and HAI Corporate Management.

Prepare an incident report. The HAI Health and Safety Officer is responsible for ensuring its preparation and submittal to the health and safety officer and HAI Corporate Management within 48 hours

2) Site-specific Instructions

Acute exposure to hazardous materials:

Dermal: Wash exposed skin areas with clean water and reassess personnel protective equipment to include adequate splash protection. Call physician when exposure is suspected.

Eye: Wash eye for 15 minutes with clean water and get immediate medical attention. Do not delay eyewash for any reason.

Inhalation: Move exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible.

3) Directions to Hospital

From the site, go north on NW Front Avenue, turn left on NW 17th Avenue turn right on NW Overton Street, turn left on NW 23rd Avenue, proceed to emergency entrance on left at NW Marshall Street, Legacy Good Samaritan Hospital emergency is located at approximately 1015 NW 23rd Avenue. A map from the site to the hospital is in Attachment B.

Page B 11 of 12
Project No. 5106
August 31, 2000

COMPANY

[illegible]

12.0 GLOSSARY OF ABBREVIATIONS

CFR	Code of Federal Regulations
HAI	Hahn and Associates, Inc.
IDLH	Immediately Dangerous to Life or Health
MSDS	material safety data sheets
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
TSP	trisodium phosphate
TWA	8-hour Time Weighted Average

ATTACHMENT A
Material Data Safety Sheets

ENVIRONMENTAL RESOURCE ASSOCIATES -- TPH IN SOIL, TPH-91
MATERIAL SAFETY DATA SHEET
NSN: 685000N067312
Manufacturer's CAGE: ENVRN
Part No. Indicator: A
Part Number/Trade Name: TPH IN SOIL, TPH-91

General Information

Company's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Company's Street: 5540 MARSHALL ST
Company's City: ARVADA
Company's State: CO
Company's Country: US
Company's Zip Code: 80002
Company's Emerg Ph #: 303-431-8454
Company's Info Ph #: 303-431-8454
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 04APR91
Safety Data Review Date: 26JAN96
MSDS Serial Number: CBWQF

Ingredients/Identity Information

Proprietary: NO
Ingredient: OIL; (OIL DISSOLVED IN ING #2)
Ingredient Sequence Number: 01
Percent: <1
NIOSH (RTECS) Number: 100922901
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: FREON GAS; (FREON)
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 1001555FG
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Physical/Chemical Characteristics

Appearance And Odor: LIGHT BROWN SOIL; ODORLESS.
Boiling Point: N/A
Melting Point: N/A
Vapor Pressure (MM Hg/70 F): N/A
Vapor Density (Air=1): N/A
Specific Gravity: 1.2
Evaporation Rate And Ref: NOT APPLICABLE
Solubility In Water: COMPLETE
pH: 7

Fire and Explosion Hazard Data

Flash Point: NOT IGNITABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).
Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: NONE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE.
Materials To Avoid: NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomp Products: NONE SPECIFIED BY MANUFACTURER.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: PRIMARY IRRITANT. IRRITATES & DEFATS THE SKIN. BURNS & IRRITATES THE EYES. MAY CAUSE COUGH, UPPER AIR WAY IRRITATION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT

Signs/Symptoms Of Overexp: IRRITATION & BURNING & REDNESS IN EYES.
IRRITATION & DEFATS THE SKIN. COUGH & CHEST PAIN.
Aed Cond Aggravated By Exp: DERMATITIS, BRONCHITIS.
Emergency/First Aid Proc: INGEST:CALL MD IMMEDIATELY (FP N). INHAL: REMOVE
FROM EXPOSURE. SKIN:WASH W/CLEAR WATER. CALL MD. EYES:WASH W/CLEAR WATER
FOR AT LEAST 15 MINUTES. CALL MD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DILUTE W/WATER. WASH TO DRAINS.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: WASH TO DRAINS OR DISPOSE OF AS NON-HAZARDOUS
SOLID. DISPOSE OF I/A/W ALL FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: AVOID CONTACT W/EYES & SKIN. DO NOT BREATHE
DUST. NO SPECIAL WORK OR HYGIENIC PRACTICES ARE REQUIRED.
Other Precautions: THIS PROD IS FURNISHED FOR LAB USE ONLY. IT IS NOT
INTENDED TO BE USED FOR ANY OTHER APPLICATION. THIS MSDS IS INTENDED TO BE
ACCURATE. MATL HEREIN DESCRIBED IS INTENDED TO BE USED BY TRAINED LAB PERS.
THIS MSDS & INFO CONTAINED IN (SUPDAT)

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR
EXPOSURE OF CONCERN (FP N).
Ventilation: ADEQUATE VENTILATION (MECHANICAL HOOD).
Protective Gloves: NEOPRENE OR VINYL GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET
ANSI DESIGN CRITERIA (FP N). LABORATORY COAT & CLOSED SHOES.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: OTHER PREC:IT SHOULD BE VIEWED AS A GUIDE TO
SAFE HANDLG OF PRODUCT. THE USER IS RESPONSIBLE FOR DETERMINING NECESSARY
PRECAUTIONS REQUIRED FOR HANDLING THIS PRODUCT IN A SAFE MANNER.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 26JAN96
Label Date: 12DEC95
Label Status: G
Common Name: TPH IN SOIL, TPH-91
Chronic Hazard: NO
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE:PRIMARY IRRITANT. IRRITATES & DEFATS THE
SKIN. BURNS & IRRITATES THE EYES. MAY CAUSE COUGH, UPPER AIR WAY
IRRITATION. CHEST PAIN. CHRONIC:NONE LISTED BY MANUFACTURER.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Label Street: 5540 MARSHALL ST
Label City: ARVADA
Label State: CO
Label Zip Code: 80002
Label Country: US
Label Emergency Number: 303-431-8454

ENVIRONMENTAL RESOURCE ASSOCIATES -- TPH IN WATER, TPH-89

MATERIAL SAFETY DATA SHEET

NSN: 685000N067311

Manufacturer's CAGE: ENVRN

Part No. Indicator: A

Part Number/Trade Name: TPH IN WATER, TPH-89

General Information

Company's Name: ENVIRONMENTAL RESOURCE ASSOCIATES

Company's Street: 5540 MARSHALL ST

Company's City: ARVADA

Company's State: CO

Company's Country: US

Company's Zip Code: 80002

Company's Emerg Ph #: 303-431-8454

Company's Info Ph #: 303-431-8454

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SMJ

Date MSDS Prepared: 04APR91

Safety Data Review Date: 13DEC95

MSDS Serial Number: CBFRF

Ingredients/Identity Information

Proprietary: NO

Ingredient: OIL DISSOLVED IN FREON

Ingredient Sequence Number: 01

Percent: <1

NIOSH (RTECS) Number: N/

OSHA PEL: N/K (FP N)

ACGIH TLV: N/K (FP N)

Proprietary: NO

Ingredient: FATTY ACIDS IN FREON

Ingredient Sequence Number: 02

Percent: <1

NIOSH (RTECS) Number: N/

OSHA PEL: N/K (FP N)

ACGIH TLV: N/K (FP N)

Proprietary: NO

Ingredient: SULFURIC ACID (SARA 302/313) (CERCLA)

Ingredient Sequence Number: 03

Percent: <2.5

NIOSH (RTECS) Number: WS5600000

CAS Number: 7664-93-9

OSHA PEL: 1 MG/M3

ACGIH TLV: 1 MG/M3;3 STEL

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID; ODORLESS.

Boiling Point: 212F,100C

Melting Point: N/A

Vapor Pressure (MM Hg/70 F): 23.76

Vapor Density (Air=1): N/A

Specific Gravity: 1

Evaporation Rate And Ref: 1 (WATER=1)

Solubility In Water: COMPLETE

pH: 2

Fire and Explosion Hazard Data

Flash Point: NOT IGNITABLE

Lower Explosive Limit: N/A

Upper Explosive Limit: N/A

Extinguishing Media: MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).

Special Fire Fighting Proc: USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire And Expl Hazrds: NONE.

Reactivity Data

Stability: YES

Cond To Avoid (Stability): NONE.

Materials To Avoid: NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomp Products: NONE SPECIFIED BY MANUFACTURER.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

<http://siri.uvm.edu/msds/h/q187/q422.html>

POPT1S605034

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: PRIMARY IRRITANT. IRRITATES & DEFATS THE SKIN. BURNS & IRRITATES EYES. MAY CAUSE COUGH, UPPER AIR WAY IRRITATION.
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: SULFURIC ACID:IARC MONOGRAPHS ON EVAL OF CARCIN RISK OF CHEMS TO MAN, VOL 54, PG 41, 1992:GRP 1. ANIMAL:PULM IRRIT.
Signs/Symptoms Of Overexp: IRRITATION & BURNING & REDNESS IN EYES. IRRITATION & DEFATS THE SKIN. COUGH & CHEST PAIN.
Med Cond Aggravated By Exp: DERMATITIS, BRONCHITIS.
Emergency/First Aid Proc: INHAL:REMOVE FROM EXPOSURE. SKIN:WASH W/ CLEAR WATER. EYES:WASH W/CLEAR WATER FOR AT LEAST 15 MINUTES. INGEST:GIVE 60 ML SYRUP OF IPECAC THEN WATER. CALL MD.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DILUTE W/WATER. WASH TO DRAINS.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: WASH TO DRAINS OR ABSORB & DISPOSE AS NONHAZARDOUS. DISPOSE OF I/A/W ALL FEDERAL, STATE & LOCAL REGULATIONS.
Precautions-Handling/Storing: PROTECT FROM FREEZING. AVOID BREAKAGE. NO SPECIAL WORK OR HYGIENIC PRACTICES ARE REQUIRED. AVOID CONTACT W/EYES & SKIN. DO NOT BREATHE DUST.
Other Precautions: THIS PROD IS FURNISHED FOR LAB USE ONLY. IT IS NOT INTENDED TO BE USED FOR ANY OTHER APPLICATION. THIS MSDS IS INTENDED TO BE ACCURATE. MATL HEREIN DESCRIBED IS INTENDED TO BE USED BY TRAINED LAB PERS. MSDS & INFO CONTAINED IN IT (SUPDAT)

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: ADEQUATE VENTILATION (MECHANICAL HOOD).
Protective Gloves: NEOPRENE OR VINYL GLOVES.
Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS (FP N).
Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N). LABORATORY COAT & CLOSED SHOES.
Work Hygienic Practices: WASH THOROUGHLY AFTER HANDLING.
Suppl. Safety & Health Data: OTHER PREC:SHOULD BE VIEWED AS GUIDE TO SAFE HNDLG OF PROD. USER IS RESPONSIBLE FOR DETERMINING NEC PRECS REQD FOR HNDLG THIS PROD IN SAFE MANNER.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 29JAN96
Label Date: 13DEC94
Label Status: G
Common Name: TPH IN WATER, TPH-89
Chronic Hazard: YES
Signal Word: CAUTION!
Acute Health Hazard-Slight: X
Contact Hazard-Slight: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE:PRIMARY IRRITANT. IRRITATES & DEFATS THE SKIN. BURNS & IRRITATES EYES. MAY CAUSE COUGH, UPPER AIR WAY IRRITATION. CHRONIC:CANCER HAZARD. CONTAINS SULFURIC ACID WHICH IS LISTED AS AN ANIMAL PULMONARY CARCINOGEN (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Label Street: 5540 MARSHALL ST
Label City: ARVADA
Label State: CO
Label Zip Code: 80002
Label Country: US
Label Emergency Number: 303-431-8454

ENVIRONMENTAL RESOURCE ASSOCIATES -- BTX-96 BTEX IN WATER/SOIL - LABORATORY STANDARD

MATERIAL SAFETY DATA SHEET

NSN: 681000F026415

Manufacturer's CAGE: 1R664

Part No. Indicator: A

Part Number/Trade Name: BTX-96 BTEX IN WATER/SOIL

General Information

Item Name: LABORATORY STANDARD

Company's Name: ENVIRONMENTAL RESOURCE ASSOCIATES

Company's Street: 5540 MARSHALL ST

Company's City: ARVADA

Company's State: CO

Company's Country: US

Company's Zip Code: 80002-3108

Company's Emerg Ph #: 303-431-8454

Company's Info Ph #: 303-431-8454

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 04APR91

Safety Data Review Date: 12MAR93

Preparer's Company: ENVIRONMENTAL RESOURCE ASSOCIATES

Preparer's St Or P. O. Box: 5540 MARSHALL ST

Preparer's City: ARVADA

Preparer's State: CO

Preparer's Zip Code: 80002-3108

MSDS Serial Number: BQJDT

Ingredients/Identity Information

Proprietary: NO

Ingredient: BENZENE (HUMAN CARCINOGEN BY ACGIH, IARC, OSHA, NTP) INTENDED CHANGE = IC

Ingredient Sequence Number: 01

Percent: <0.1

NIOSH (RTECS) Number: CY1400000

CAS Number: 71-43-2

OSHA PEL: 1 PPM (8 HR TWA)

ACGIH TLV: 0.3 MG/CUM (A2)

Other Recommended Limit: 16 MG/CUM

Proprietary: NO

Ingredient: TOLUENE

Ingredient Sequence Number: 02

Percent: <0.1

NIOSH (RTECS) Number: XS5250000

CAS Number: 108-88-3

OSHA PEL: 200 PPM/150 STEL

ACGIH TLV: 60 PPM; 9293

Other Recommended Limit: 375 MG/CUM

Proprietary: NO

Ingredient: O-XYLENE

Ingredient Sequence Number: 03

Percent: <0.1

NIOSH (RTECS) Number: ZE2450000

CAS Number: 96-47-6

ACGIH TLV: 100 PPM

Proprietary: NO

Ingredient: M-XYLENE

Ingredient Sequence Number: 04

Percent: <0.1

NIOSH (RTECS) Number: ZE2275000

CAS Number: 108-38-3

ACGIH TLV: 100 PPM

Proprietary: NO

Ingredient: P-XYLENE

Ingredient Sequence Number: 05

Percent: <0.1

NIOSH (RTECS) Number: ZE2625000

CAS Number: 106-42-3

ACGIH TLV: 100 PPM

Proprietary: NO

Ingredient: METHANOL (METHYL ALCOHOL), COLUMBIAN SPIRITS

Ingredient Sequence Number: 06

Percent: >99

NIOSH (RTECS) Number: PC1400000

CAS Number: 67-56-1

OSHA PEL: S200PPM/250STEL

ACGIH TLV: S200PPM/250STEL; 93

Other Recommended Limit: 200 PPM

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID ORGANIC ODOR
 Boiling Point: 64.5C
 Vapor Density (Air=1): 1.11
 Specific Gravity: 0.792
 Solubility In Water: COMPLETE

Fire and Explosion Hazard Data

Flash Point: 15C
 Flash Point Method: TOC
 Extinguishing Media: DRY CHEMICAL, CO2, ALCOHOL FOAM.
 Special Fire Fighting Proc: IF LARGE AMOUNTS INVOLVED IN FIRE USE SCBA & WET DOWN TO KEEP FROM EXPLODING. USE WATER MIST OR ALCOHOL FOAM.
 Unusual Fire And Expl Hazards: MAY FORM CO, PHOSGENE & CARBONYL BROMIDE WHEN INVOLVED IN FIRE.

Reactivity Data

Stability: YES
 Materials To Avoid: CHROMIC ANHYDRIDE, IODINE, ETHANOL, MERCURIC OXIDE, POTASSIUM HYDROXIDE, SODIUM HYDROXIDE/CHLOROFORM/LEAD PERCHLORATE.
 Hazardous Poly Occur: NO

Health Hazard Data

Route Of Entry - Inhalation: YES
 Route Of Entry - Skin: NO
 Route Of Entry - Ingestion: YES
 Health Haz Acute And Chronic: INHALATION: LUNG, LIVER & KIDNEY DAMAGE. CANCER, CARDIAC ARRHYTHMIA, HEART SENSITIZATION TO EPINEPHRINE, ACIDOSIS, LEUKEMIA, LYMPHOMA, APLASTIC ANEMIA & OTHER BLOOD DISORDERS.
 Carcinogenicity - NTP: YES
 Carcinogenicity - IARC: YES
 Carcinogenicity - OSHA: YES
 Explanation Carcinogenicity: SEE INGREDIENTS
 Med Cond Aggravated By Exp: DERMATITIS, LIVER DISEASE, KIDNEY DISEASE.
 Emergency/First Aid Proc: INHALATION: REMOVE TO FRESH AIR. SKIN/EYE: WASH W/PLENTY OF CLEAR WATER. INGESTION: GIVE SYRUP OF IPECAC, 60 CC WITH 180 CC WATER. BE PREPARED TO DO CPR. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: DAM UP & ABSORB. VENTILATE THE AREA. CALL CLEANUP TEAM. DON'T WASH TO DRAINS.
 Waste Disposal Method: DISPOSE OF IN ACCORDANCE W/FEDERAL, STATE & LOCAL REGULATIONS.
 Precautions-Handling/Storing: AVOID FREEZING, BREAKAGE, STORE AWAY CHEMICALS. PRODUCT FOR LABORATORY USE ONLY. IT IS NOT INTENDED TO BE USED FOR ANY OTHER APPLICATION.
 Other Precautions: AVOID CONTACT W/EYES/SKIN. USE ADEQUATE VENTILATION. THIS MATERIAL IS INTENDED TO BE USED BY TRAINED LABORATORY PERSONNEL.

Control Measures

Respiratory Protection: ORGANIC VAPOR CARTRIDGE, FULL FACE PIECE OR SELF-CONTAINED AIR SUPPLIED RESPIRATOR.
 Ventilation: ADEQUATE. (MECHANICAL HOOD)
 Protective Gloves: VITON OR VINYL
 Eye Protection: SAFETY GLASSES
 Other Protective Equipment: LABORATORY COAT & CLOSED SHOES.
 Work Hygienic Practices: REMOVE & WASH CONTAMINATED CLOTHES BEFORE REUSE. WASH HANDS THOROUGHLY AFTER HANDLING.

Transportation Data

Disposal Data

Label Data

Label Required: YES
 Technical Review Date: 12MAR93
 Label Date: 08FEB93
 Label Status: F
 Common Name: BTEX IN WATER/SOIL
 Chronic Hazard: YES
 Signal Word: DANGER!
 Acute Health Hazard-Severe: X
 Contact Hazard-Moderate: X
 Fire Hazard-Severe: X
 Reactivity Hazard-Slight: X

<http://sirl.uvm.edu/msds/h/q161/q383.html>

POPT1S605037

IRRITATION, ALLERGIC DERMATITIS, DAMAGES ALL TISSUE. INGESTION: CANCER, CARDIAC ARRHYTHMIA, HEART SENSITIZATION TO EPINEPHRINE, ACIDOSIS, LEUKEMIA, LYMPHOMA, APLASTIC ANEMIA & OTHER BLOOD DISORDERS. CARCINOGEN: BENZENE. TARGET ORGANS: LUNG, LIVER, KIDNEY, HEART, BLOOD. SUSPECTED CARCINOGEN BY ACGIH: CARBON BLACK.

Protect Eye: Y

Protect Skin: Y

Protect Respiratory: Y

Label Name: ENVIRONMENTAL RESOURCE ASSOCIATES

Label Street: 5540 MARSHALL ST

Label City: ARVADA

Label State: CO

Label Zip Code: 80002-3108

Label Country: US

Label Emergency Number: 303-431-8454

Year Procured: UNK

ULTRA SCIENTIFIC -- US-116 POLYNUCLEAR AROMATIC HYDROCARBONS MIXTURE
MATERIAL SAFETY DATA SHEET
NSN: 681000F037641
Manufacturer's CAGE: 0MU35
Part No. Indicator: A
Part Number/Trade Name: US-116 POLYNUCLEAR AROMATIC HYDROCARBONS MIXTURE

General Information

Item Name: AT 2000 UG/ML IN METHYLENE CHLORIDE/BENZENE

Company's Name: ULTRA SCIENTIFIC

Company's Street: 250 SMITH STREET

Company's City: NORTH KINGSTOWN

Company's State: RI

Company's Country: US

Company's Zip Code: 02852-5000

Company's Emerg Ph #: 401-294-9400

Company's Info Ph #: 401-294-9400

Record No. For Safety Entry: 001

Tot Safety Entries This Sk#: 001

Status: SE

Date MSDS Prepared: 15AUG94

Safety Data Review Date: 13DEC94

Preparer's Company: ULTRA SCIENTIFIC

Preparer's St Or P. O. Box: 250 SMITH STREET

Preparer's City: NORTH KINGSTOWN

Preparer's State: RI

Preparer's Zip Code: 02852-5000

MSDS Serial Number: BWJNN

Ingredients/Identity Information

Proprietary: NO

Ingredient: DICHLOROMETHANE (METHYLENE CHLORIDE) (SUSP HUMAN CARC BY

ACGIH, SUSP ANIM CARC BY IARC; NTP - IARC GROUP 2B) *94-4*

Ingredient Sequence Number: 01

Percent: 49.82

NIOSH (RTECS) Number: PA8050000

CAS Number: 75-09-2

ACGIH TLV: 174 MG/CUM (A2)

Proprietary: NO

Ingredient: BENZENE (SUSPECTED HUMAN CARC BY ACGIH, IARC, SUSPECTED ANIMAL

CARC BY IARC, CARCINOGEN BY NTP - GROUP 1) *94-4*

Ingredient Sequence Number: 02

Percent: 49.82

NIOSH (RTECS) Number: CY1400000

CAS Number: 71-43-2

ACGIH TLV: 0.3 MG/CUM (A2) IC

Other Recommended Limit: 16 MG/CUM

Proprietary: NO

Ingredient: 7,12-DIMETHYLBENZ-*a*-ANTHRACENE

Ingredient Sequence Number: 03

Percent: 0.182

NIOSH (RTECS) Number: CW3850000

CAS Number: 57-97-6

Proprietary: NO

Ingredient: 3-METHYLCHOLANTHRENE

Ingredient Sequence Number: 04

Percent: 0.182

NIOSH (RTECS) Number: FZ3675000

CAS Number: 56-49-5

Physical/Chemical Characteristics

Appearance And Odor: LIQUID

Fire and Explosion Hazard Data

Extinguishing Media: CO2, DRY CHEMICAL POWDER, WATER SPRAY

Reactivity Data

Stability: YES

Materials To Avoid: STRONG OXIDIZERS

Hazardous Poly Occur: NO

Health Hazard Data

LD50-LC50 Mixture: ORAL LD50 (RAT): 2136 MG/KG (SEE SUPP)

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: TOXIC, IRRITATION.

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: SEE INGREDIENTS

Signs/Symptoms Of Overexp: IRRITATION.

Emergency/First Aid Proc: EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER.

INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN, IF NEEDED. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: A LEAKING BOTTLE MAY BE PLACED IN A PLASTIC BAG & NORMAL DISPOSAL PROCEDURES FOLLOWED. LIQUID SAMPLES MAY BE ABSORBED ON VERMICULITE/SAND.

Waste Disposal Method: BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER. DISPOSE OF IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Precautions-Handling/Storing: USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT. KEEP TIGHTLY CLOSED & STORE IN A COOL, DRY PLACE.

Other Precautions: THIS MATERIAL SHOULD ONLY BE USED BY THOSE PERSONS TRAINED IN THE SAFE HANDLING OF HAZARDOUS CHEMICALS.

Control Measures

Protective Gloves: REQUIRED

Eye Protection: CHEMICAL GOGGLES, FACESHIELD

Other Protective Equipment: CHEMICAL RESISTANT CLOTHING, LAB COAT/RUBBER APRON.

Suppl. Safety & Health Data: ORAL LD50 INFORMATION IS FOR METHYLENE CHLORIDE.

Transportation Data

Disposal Data

Label Data

Label Required: YES

Label Status: G

Common Name: US-116 POLYNUCLEAR AROMATIC HYDROCARBONS MIXTURE

Special Hazard Precautions: TOXIC, IRRITATION, IRRITATION.

Label Name: ULTRA SCIENTIFIC

Label Street: 250 SMITH STREET

Label City: NORTH KINGSTOWN

Label State: RI

Label Zip Code: 02852-5000

Label Country: US

Label Emergency Number: 401-294-9400

Please reduce your browser font size for better viewing and printing.

24 Hour Emergency Telephone: 800-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-896-6666

Outside U.S. and Canada
Chemtrec: 202-483-7618

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

DIOCTYLPHTHALATE

MSDS Number: E6500 --- Effective Date: 03/05/97

1. Product Identification

Synonyms: Di-(2-ethylhexyl)phthalate; DEHP; bis(2-ethylhexyl)phthalate; DOP; 1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl)ester; Di-sec-octyl phthalate
CAS No.: 117-81-7
Molecular Weight: 390.56
Chemical Formula: C₂₄H₃₈O₄
Product Codes: H187

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Di-sec-octyl Phthalate	117-81-7	100%	Yes

3. Hazards Identification**Emergency Overview**

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE CENTRAL NERVOUS SYSTEM, LIVER, REPRODUCTIVE SYSTEM, AND GASTROINTESTINAL TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure. MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS.

Potential Health Effects**Inhalation:**

The low vapor pressure of this material essentially eliminates inhalation hazards unless the material is heated or misted. Inhalation of mists can cause nausea and is irritating to the respiratory tract.

Ingestion:

Ingestion causes nausea, abdominal cramps, diarrhea. CNS depression - lethargy, drowsiness, staggering and sleepiness - can result from absorbing large amounts.

Skin Contact:

Slight skin irritation may occur from prolonged skin contact. Low levels may be absorbed through the skin.

Eye Contact:

Causes irritation, redness, and pain.

Chronic Exposure:

Material is a suspected carcinogen and a suspected teratogen.

Aggravation of Pre-existing Conditions:

No information found.

4. First Aid Measures

<http://www.jtbaker.com/msds/e6500.htm>

POPT1S605041

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:

Do NOT induce vomiting. Give large amounts of water. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Flash point: 215C (419F) OC Autoignition temperature: 390C (734F) Flammable limits in air, % by volume: 0.3 Slight fire hazard.

Explosion:

Above the flash point, explosive vapor-air mixtures may be formed.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL): 5 mg/m3 (TWA). - ACGIH Threshold Limit Value (TLV): 5 mg/m3 (TWA), 10 mg/m3 (STEL); A3 - animal carcinogen.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a full facepiece respirator with dust/mist filter may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Clear oily liquid.

Odor:

<http://www.jtbaker.com/msds/e6500.htm>

Slightly amine to odorless.

Solubility:

Insoluble in water.

Specific Gravity:

0.9861 @ 20C/20C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

230C (446F)

Melting Point:

-50C (-58F)

Vapor Density (Air=1):

16.

Vapor Pressure (mm Hg):

1.32 @ 200C (392F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Nitrates, strong oxidizers, acids and alkalis.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 30 g/kg; Skin rabbit LD50: 25 g/kg. Irritation Data (rabbit, std Draize, 500mg/24H): Skin, mild; Eye, mild. Investigated as a tumorigen, mutagen, reproductive effector.

Cancer Lists**--NTP Carcinogen--**

Ingredient	Known	Anticipated	IARC Category
Di-sec-octyl Phthalate (117-81-7)	No	Yes	2B

12. Ecological Information

Environmental Fate:

When released into water, this material may biodegrade to a moderate extent. This material may bioaccumulate to some extent. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:

The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----
Ingredient TSCA EC Japan Australia

Di-sec-octyl Phthalate (117-81-7) Yes Yes Yes Yes

-----\Chemical Inventory Status - Part 2\-----
-----Canada-----

Ingredient Korea DSL NDSL Phil.

Di-sec-octyl Phthalate (117-81-7) Yes Yes No Yes

-----\Federal, State & International Regulations - Part 1\-----
-----SARA 302-----SARA 313-----

Ingredient RQ TPQ List Chemical Catg.

Di-sec-octyl Phthalate (117-81-7) No No Yes No

-----\Federal, State & International Regulations - Part 2\-----
-----RCRA-----TSCA-----

Ingredient CERCLA 261.33 8(d)

Di-sec-octyl Phthalate (117-81-7) 100 U028 No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Prop 65:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: No information found.

Poison Schedule: No information found.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 1 Flammability: 1 Reactivity: 0

Label Hazard Warning:

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE CENTRAL NERVOUS SYSTEM, LIVER, REPRODUCTIVE SYSTEM, AND GASTROINTESTINAL TRACT. POSSIBLE CANCER HAZARD. MAY CAUSE CANCER BASED ON ANIMAL DATA. Risk of cancer depends on duration and level of exposure. MAY CAUSE ADVERSE REPRODUCTIVE EFFECTS.

Label Precautions:

Do not get in eyes, on skin, or on clothing. Do not breathe mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

Label First Aid:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:

***** Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

***** Prepared by: Strategic Services

Division

Phone Number: (314) 539-1600 (U.S.A.)

<http://www.jtbaker.com/msds/e6500.htm>

POPT1S605044

ATTACHMENT B

Hospital Map

